ANALOG & SMART DIGITAL ZEUS™ pH SENSORS FOR TOUGH INDUSTRIAL APPLICATIONS TYPICALLY IN STOCK FOR IMMEDIATE DISPATCH * TO SOLVE YOUR PROBLEM INSTALLATION RIGHT AWAY

* *"In Stock for Immediate Dispatch" refers to small quantity orders for retail end-users. Shipments are dispatched after acceptance of order including settling of credit related details.*
Agents and distributors please inquire for lead time. For larger quantity orders please inquire to factory for best lead time available for the particular configuration of interest.

ZEUS™ Industrial Grade pH sensors are designed and built with Extremely Rugged Construction to handle the Toughest Severe Service Process Inline, Immersion or Submersible Installations.

Unique solid-state non-porous conductive polymer reference technology and thick-wall break-resistant parabolic pH glass sensing elements along with the specially designed construction of ZEUS™ pH sensors ensure the longest service lifetime possible in aggressive media such as abrasive slurries and solutions with high particulate content.

ZEUS™ pH Sensors support High Temperatures & High Pressures for Process Solutions with Dissolved Ammonia, Chorine, and Sulfide gases and are compatible with most Organic Solvents.

ZEUS™ pH Sensors are available in three <u>ANALOG CONFIGURATIONS</u> to interface most all-existing OEM transmitters:

1. **<u>UNIVERSAL (Item # 1202)</u> configuration is without integral preamplifiers for instruments that can accept this type of pH sensor and installations that do not require longer than 25 feet of cable (cable length for UNIVERSAL sensors <u>cannot</u> be extended)**

2. **<u>WITH CONVENTIONAL PREAMPLIFIER (Item # 1203)</u> configuration is for instruments that can accept this type of pH sensor with 20 feet cable standard & NEMA 6P snap connector; Max 330 feet total cable length with snap extensions**

3. **<u>WITH 5-WIRE DIFFERENTIAL PREAMPLIFIER (Item # 1204)</u> configuration is for instruments that can accept this type of pH sensor with 20 feet cable standard & NEMA 6P snap connector; Max 1,000 feet total cable length with snap extensions**

ZEUS™ pH Sensors are available in the <u>SMART DIGITAL CONFIGURATION</u> to provide a complete plug & play zero-configuration turn-key pH measurement system solution including mating intelligent 3TX-HiQ-pH transmitter:

<u>WITH SMART DIGITIAL SENSOR BOARD (Item # 1205)</u> configuration for use with the 3TX-HiQ-pH intelligent transmitter that accepts IOTRON™ & ZEUS™ smart digital pH sensors; Comes complete with 20 feet cable standard & NEMA 6P snap connector; Max 2,000 feet total cable length with snap extensions

Complete specification sheets linked above for item # 1202, 1203, 1204 or 1205 configurations can also be obtained from the QR code on the respective ZEUS™ sensor label via the QR scanner app on your mobile device

While the ZEUS™ pH Sensors are only available in the configurations as detailed above, all other IOTRON™ series pH sensors can be custom built-to-order specific to your exact application requirements. Please review our **pH sensor overview webpage** to select the customizable product line that is most suitable for your need if you prefer this option. All other IOTRON™ series pH sensors are not in stock since they are built-to-order to suit specific requirements. Lead times are normally relatively nominal since most all necessary components are well stocked for most combinations and the availability is only limited by actual manufacturing time, processing of the order and time in the production queue.

SELECTED FEATURES OF INTEREST FOR ALL ZEUS™ SENSORS:

- Best reference service lifetime in process industry through the proprietary and novel non-porous, cross-linked conductive polymer technology with triple junction is standard for all ZEUS™ sensor configurations.

  o This solid-state proprietary reference system is nearly impervious to intrusion from most all gases, ions and solvents to facilitate minimal cleaning and recalibration and maximum service lifetime.

- The extremely rugged industrial grade construction including an extra thick sensor body housing makes ZEUS™ sensors the ideal choice to operate in most any installation in a temperature range at pressures up to 200 psig for 1"MNPT screw-in type inline style installations or immersion & submersible type installations with aggressive abrasives that can induce mechanical wear. The 5.6mm (0.22") thickness for the back of the sensor body minimizes the impact of the process exposure due to mixers, vibration and other stress induced by rugged field installations.

- The solid state reference is highly resistant to dehydration and our thick wall parabolic glass is nearly impervious to cracking, even under high pressure and flow conditions.

- Supports continuous use from -15 to +150 degrees Celsius to handle most any process conditions.

- Standard features all ZEUS™ sensor configurations include Ammonia, Chlorine and Sulfide Gas Resistant and can operate pH media from -0.5 to +14.5 in the presence of most organic media & volatile solvents.

- All ZEUS™ sensor configurations include ACCU-TEMP Fast Response Pt1000 Temperature Compensation (TC) Element and 4 each Ultra-Thick 3.0mm (0.12") Protective Tines to avoid pH glass breakage in handling and field use

- Universal and 5-wire differential preamplifier configurations of ZEUS™ pH sensors include Solution Ground Liquid Earth with Hastelloy® C-276 Material of Construction to ensure suitability for most any process chemistry

- UNIVERSAL CONFIGURATION terminated with tinned leads and the **wiring schematic detail** can be used to interface to your mating OEM pH transmitter (see list of supported transmitters below).

- **WITH CONVENTIONAL PREAMPLIFIER CONFIGURATION** OR **WITH 5-WIRE DIFFERENTIAL PREAMPLIFIER CONFIGURATION** are terminated with quick disconnect IP67 & NEMA 6P rated waterproof and corrosion resistant snap Q7M/Q7F connectors as detailed in the respective installation guides linked above.

- Back of sensor 1.25" MNPT threads are sealed with robust waterproofing assembly so that all ZEUS™ pH sensors are suitable for use in immersion or submersible type applications as well as for inline use.

- Wrench flats feature is standard to allow for securing sensor into threaded 1" NPT inline process connection or 1.25" NPT immersion tube without damaging sensor body.

  o Care must be taken not to over-tighten any sensor to avoid damage during commissioning or insertion and removal from process for cleaning, recalibrating or replacement during maintenance. Consult ASTI factory for assistance to ensure best practice care and use. The **general care and maintenance guide for pH sensors** is the starting basis but inquire to the ASTI factory for specific best practice instructions for your particular application for optimal results.

- ZEUS™ pH sensors are manufactured with RADEL® (Poly-Phenyl-Sulfone, PPSU) sensor body housing materials of construction & KYNAR® (Poly-Vinylidene-Fluoride, PVDF) to handle the most difficult field process measurements.

  o Technical information regarding the chemical resistance as well as the thermal and mechanical properties for these materials of construction are provided to assist with confirmation of suitability for your intended process use.

- **Thick-wall break resistant low-profile parabolic pH glass element for slurry and viscous type process media extends service life for tough installations.**

  o Rugged thick-wall, low-profile, break-resistant parabolic pH glass standard for the WITH CONVENTIONAL PREAMPLIFIER OR 5-WIRE DIFFERENTIAL PREAMPLIFIER ZEUS™ pH SENSOR CONFIGURATIONS

FEATURES THAT ARE SPECIFIC ONLY TO THE SMART DIGITAL CONFIGURATION OF THE ZEUS™ pH SENSOR:

- Integral smart digital board stores calibrations & transmitter configuration in sensor

- Waterproof NEMA 6P quick disconnect HiQ4M Snap Corrosion Resistant Connector

- Up to 610 meters (2,000 feet) noise insensitive digital cable with HiQ4F extensions

- True plug and play sensor with automatic loading of calibration values for hot-swap

- Calibrate conveniently in lab or shop and install quick-disconnect sensor in the field

- Advanced autoread algorithm for reproducible & operator independent calibrations

- Automatic recognition of 4.00, 6.86, 7.00, 9.18 & 10.00 NIST traceable pH buffers with built-in correction for temperature induced changes to pH buffer value

- Reliable readings in acidic or alkaline range with 1-point, 2-point or 3-point calibrations

- Calibrate with sophisticated HiQ Windows software or any 3TX-HiQ-pH transmitter

- Entire transmitter configuration can be downloaded to sensor or uploaded from sensor to intelligent 3TX-HiQ-pH transmitter for advanced management of field installations

- Stores last five offset (1-point), slope (2-point & 3-point) and temperature calibrations

- See **3TX-HiQ webpage** for complete set of features & functionality for the smart digital platform
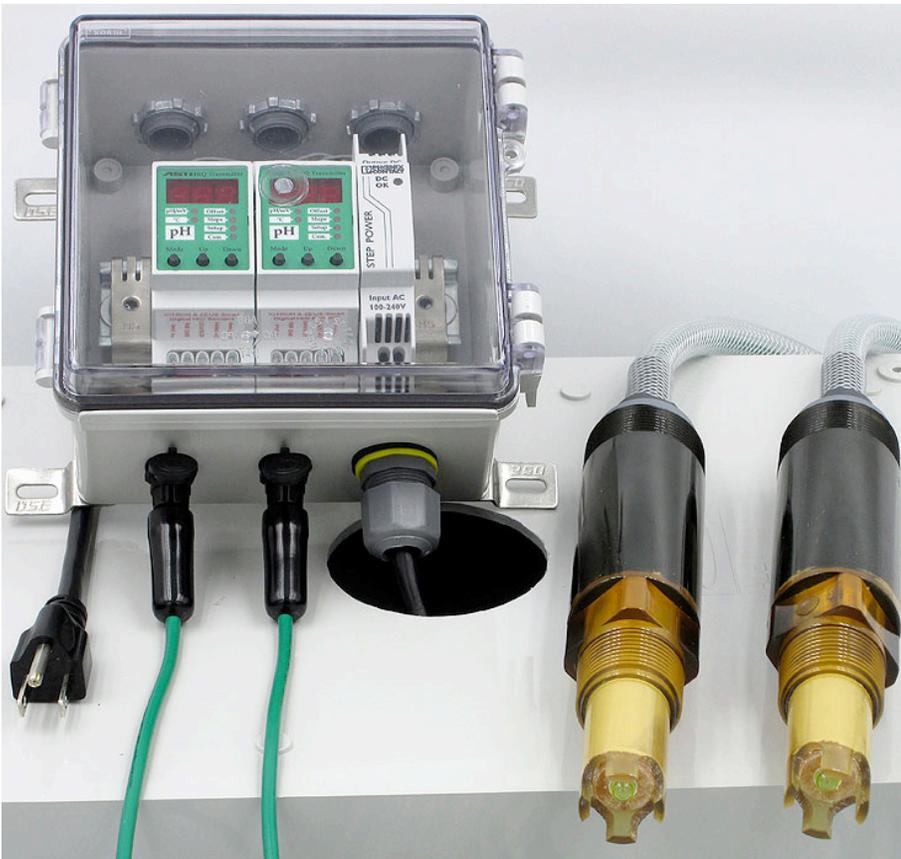
ZEUS™ pH Sensors in the Smart Digital Configuration (Item # 1205) terminated with NEMA 6P rated HiQ4M snap connectors are shown connected to the NEMA 4X field rated dual channel 3TX-3MF-2H-2EA-HiQ-pH-PS intelligent pH transmitter (Item # 11305).

Two (2) each female panel mount HiQ4FP snap connectors are installed into the 3MF NEMA 4X CSA/UL rated enclosure assembly. The sealing cap is slid off when the sensors are connected and affixed when the sensor is not in use. When the HiQ4M male snap connector is interfaced to the receiving HiQ4FP panel mount snap connector the result is a NEMA 6P rated assembly.

Additional cable length beyond the standard 20 feet (6 meters) is obtained by employing the snap to snap (HiQ4F-Xm-HiQ4M) where X is the length of the extension cable in units of meters. Maximum permissible total cable length is 2,000 feet (610 meters).

PRIME PROCESS APPLICATIONS FOR ZEUS™ pH SENSORS

- Measurement in strong acids or bases

- Acid fluoride etching solutions

- HF waste treatment systems

- High Temperatures & Pressures

    o Examples include ammonium nitrate manufacturing, sugar extraction

    o Treatment of discharge from processes employing autoclaves

- Pulp digesters for Kraft type mills

- Bleaching lines for white paper mills

- Abrasives and Viscous Processes

- Extraction of precious metal ore with floatation tanks and concentrators

- Gold extraction circuits with cyanide (batch or continuous)

- Cyanide destruction with peroxide and/or sulfur dioxide

- Dissolved Sulfides such as hydrogen sulfide gas (H_2S), hydrogen sulfide (HS^-) or sulfide ion (S^{2-})

- Solvent extraction (SX) with kerosene and other long chain hydrocarbons

- Measurement in most Volatile Organic Compounds (VOC) and most Organic Solvents

- Biodiesel and ethanol fuels

- Processes employing dissolved chlorine (Cl_2), chlorine dioxide (ClO_2), ammonia (NH^3), sulfur dioxide (SO_2) and nitric oxide (NO) and nitrous oxide (NO_2) sometimes together referred to as (NO_x) type gases

- Municipal or industrial wastewater treatment

- General Purpose pH monitoring or control for discharge compliance

View Selected Case Studies as Examples of Selected Applications

TECHNICAL CAPABILITIES OF ZEUS™ pH SENSORS

- Low pH range down to -0.5 (with ASTI calibration procedures and buffers)

- High pH range up to 14.5 (with ASTI calibration procedures and buffers)

- Low Temperatures down to -15 degrees Celsius (°C)

- High Temperatures up to 150 degrees Celsius (°C)

- High Pressures up to 200 psig

- Insertion depths up to 6 feet into tank or line with **compression fitting assembly installation scheme**

- Mining Slurries up to 50% solid & particulate content

- Solids Content up to 12% consistency pulp

- Fluorides up to 50,000 ppm and -0.5 pH

- Support for measurement in most dissolved gases up to saturation

    o Examples include chlorine, chlorine dioxide, ammonia, sulfide gases

- Cyanides up to 10,000 ppm

- Almost All Organic Chemical Mixtures

    o Minimum ~1% aqueous content required to ensure stable readings

- Clean in Place (CIP) processes with hot acid and hot base for food and beverage and pharmaceutical use

- Sterilization with Peroxide (H_2O_2) and Ozone (O_3)

- Up to 600% Saturation Dissolved Oxygen (O_2)

- Fully submersible assembly that can be installed by thick reinforced vinyl tubing seal on cable

    o For best results the use of a suitable immersion tube, standpipe or guiderod is recommended to fix the installation location and to minimize mechanical related damage is recommended
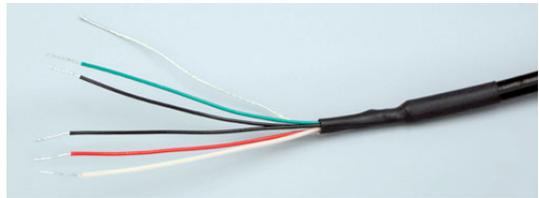
PLEASE INQUIRE FOR ANY CAPABILITIES NOT LISTED HERE

Pictures for Visualization of Analog ZEUS™ pH Sensors in Universal and with Conventional or Differential Preamplifier Configurations

ZEUS™ pH Sensor Universal Configuration with 25 feet cable assembly complete, submersible to 12 feet

Front View of ZEUS™ pH Sensor Sensing Tip

ZEUS™ pH Sensor Universal Configuration End of Cable Tinned Lead Wire Terminations

ZEUS™ pH sensor with Analog Preamplifier Configuration with 20 foot snap extension cable connected Max 330 for with Conventional Preamplifier Configuration & Max 1,000 feet for with Differential Preamplifier Configuration
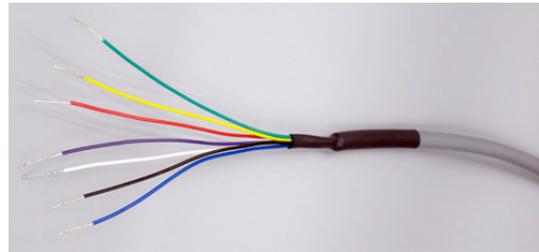
ZEUS™ pH Sensor Analog Preamplifier Configuration with 20 feet cable assembly complete, submersible to 12 feet

Snap Extension Cable for ZEUS™ pH Sensor with Preamplifiers Stocked in 5 feet, 10 feet, 20 feet & 40 feet cable lengths Other cable lengths available as special order option

Male Snap from ZEUS™ pH sensor Connected to Female Snap from Extension Cable NEMA 6P rated for use in aggressive field service

Snap Extension Cable for ZEUS™ pH Sensor End of Cable Tinned Lead Wire Terminations Detail

Dimensional Drawing & Details for Analog ZEUS™ pH Sensors for Inline, Immersion & Submersion Industrial Process Installations

Black cable with tinned leads for universal configuration style

1.00 DIA

2.00

1.06

0.75

Flats for 1-5/16" Wrench (~34mm) 4 Places, 90 degrees Apart

1.66 DIA MAX

Hemispherical pH glass for universal configuration or parabolic pH glass for preamplifier configurations

3/8" Hose Barb

3/8" x 5/8" Vinyl Tubing 12 feet long

1/2" MNPT to 3/8" Hosebarb Connector

1"-1/2" FNPT Reducer Bushing

0.50

1"-11.5 NPT

1.25"-11.5 NPT

8.50

Gray cable with Snap Connectors for Preamplifier Configurations

Selected Pictures for Visualization of ZEUS™ pH Sensor in the Smart Digital Configuration

ZEUS™ pH sensor in Smart Digital Configuration with 20 feet (6 meter) snap extension cable connected
Max 2,000 feet (610 meters) total table length for Smart Digital Sensor Configuration used with intelligent 3TX-HiQ-pH Transmitter

ZEUS™ pH Sensor in Smart Digital Configuration with 20 feet cable assembly complete, submersible to 12 feet. Shown with protective cap installed on NEMA 6P rated quick-disconnect snap connector termination as shipped from factory.

Snap Extension Cable for ZEUS™ pH Sensor in Smart Digital Configuration. Stocked in 10 feet, 20 feet, 40 feet (shown above) & 80 feet cable lengths. Other cable lengths are available as special order option
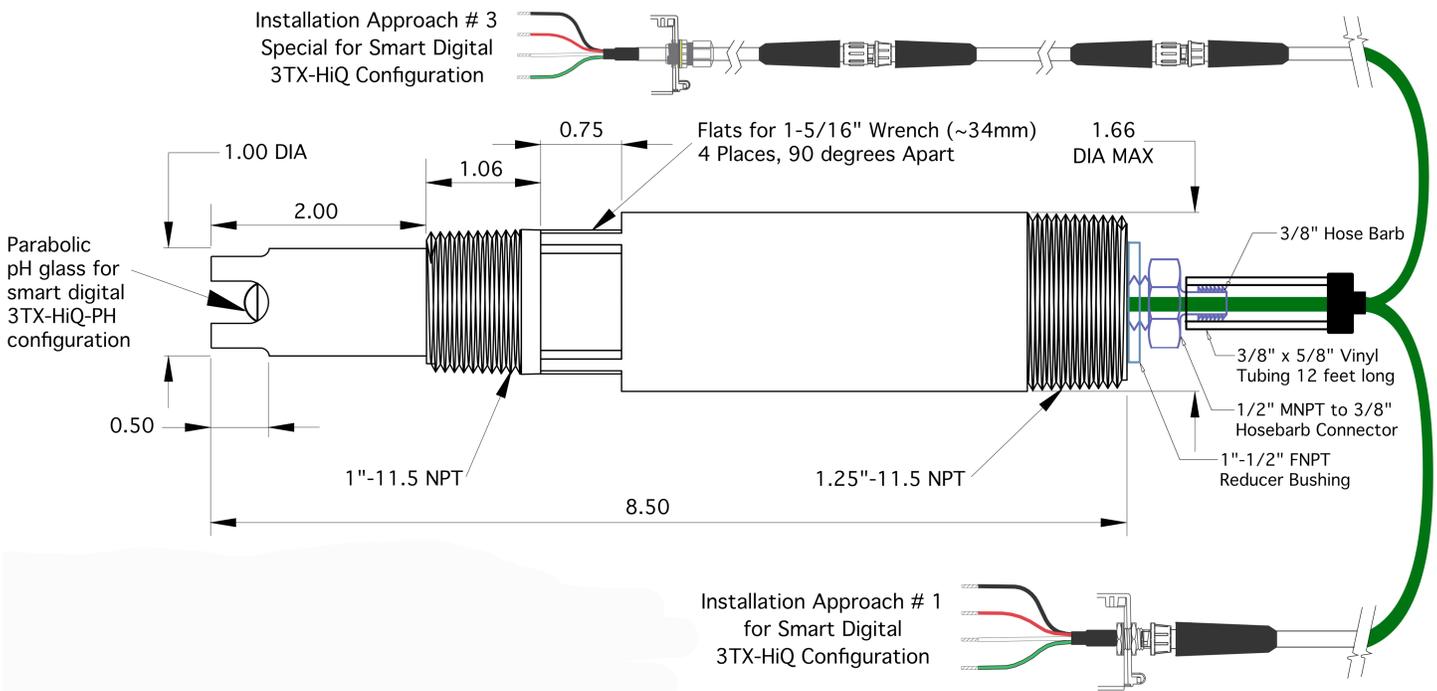
Male Snap from ZEUS™ pH sensor in Smart Digital Configuration connected to Female Snap from Extension Cable NEMA 6P rated for use in aggressive field service

Close-up of ZEUS™ pH sensor measuring tip. Solid-state conductive polymer reference system (brown) is sealed to thick-wall break-resistant low-profile parabolic pH sensing element (green) protected by ultra-rugged 4 each protective tines for guard

Dimensional Drawing for ZEUS™ Smart Digital pH Sensors for Inline, Immersion & Submersion Industrial Process Installations for use with 3TX-HiQ-pH Intelligent Digital pH Transmitter

Installation Approach # 3
Special for Smart Digital
3TX-HiQ Configuration

1.00 DIA

2.00

1.06

0.75

Flats for 1-5/16" Wrench (~34mm)
4 Places, 90 degrees Apart

1.66
DIA MAX

3/8" Hose Barb

Parabolic
pH glass for
smart digital
3TX-HiQ-PH
configuration

0.50

1"-11.5 NPT

1.25"-11.5 NPT

8.50

3/8" x 5/8" Vinyl
Tubing 12 feet long

1/2" MNPT to 3/8"
Hosebarb Connector

1"-1/2" FNPT
Reducer Bushing

Installation Approach # 1
for Smart Digital
3TX-HiQ Configuration

COMPATIBLE TRANSMITTERS FOR ANALOG ZEUS™ pH SENSORS

COMPATIBILITY COLOR CODING GUIDE:

UNIVERSAL CONFIGURATION COMPATIBLE TRANSMITTER SHOWN IN **PURPLE**

5-WIRE DIFFERENTIAL CONFIGURATION COMPATIBLE TRANSMITTERS SHOWN IN **PINK**

TRANSMITTERS COMPATIBLE WITH **BOTH UNIVERSAL & CONVENTIONAL PREAMPLIFIER CONFIGURATION** SHOWN IN **BLUE**

Replacement pH Sensors for Transmitters that support and/or require Integrated Preamplifiers UNIVERSAL AND/OR CONVENTIONAL / DIFFERENTIAL PREAMP CONFIGURATIONS

The instruments listed below require and/or support integral preamplifiers. Sensors to mate with these OEM pH & ORP transmitters are supplied with the appropriate integrated temperature compensation element, solution ground & OEM compatible high-impedance CMOS operational amplifier (a.k.a. preamplifier) as required to ensure full compatibility and optimal performance. Some analyzer models can support both sensors with or without preamplifiers on the same instrument.

Replacement pH Sensors For Transmitters DO NOT SUPPORT Integrated Preamplifiers UNIVERSAL CONFIGURATION ONLY

The instruments listed below do no support preamplifiers. Sensors to mate with these OEM pH & ORP transmitters are supplied with the appropriate internal temperature compensation and/or solution ground signals to ensure compatibility. If longer cable runs may be required for your planned installation, it is recommended to select a transmitter that supports preamplifiers (see list to the left).

Fully Supported Hardware – FULL COMPATIBILITY

Manufacturer	pH & ORP Transmitters	OEM pH & ORP Sensors *
Rosemount Analytical Liquid Division A Part of Emerson Process Management	**LEGACY:** 54pH, 54epH, XMT **MODERN:** 1056, 1057, 56, 1066, 5081, 6081	385/385+, 389, 3900 pH & ORP sensors 3300HT, 3400HT & 3500P PERpH-X™ pH & ORP sensors 397, 398/398R, TF396 TUpH™ pH & ORP sensors
Foxboro Analytical EChem by Schneider Electric (a Division of Invensys)	**LEGACY:** 870IT **MODERN:** 875PH, 876PH	PH10 DolpHin™ pH sensors, ORP10 DolpHin™ ORP sensors, 871A & 871PH pH & ORP sensors, EP460 & EP466 pH & ORP sensors

Fully Supported Hardware - FULL COMPATIBILITY

Manufacturer	pH & ORP Transmitters	OEM pH & ORP Sensors *
Endress+Hauser (a.k.a. E+H)	**LEGACY:** CPM152, CPM280, CPM431 **MODERN:** CPM153, CPM223, CPM253	Inquire to ASTI Factory for alternatives to E+H pH & ORP sensors
Mettler-Toledo International (formerly Ingold)	**LEGACY:** 1120, 1140, 2050, 2100, 2220, 2400, 2500, 2800X, 2050e, pH 2100-PA, pH 2100e **MODERN:** M200, M300, M400, M700, M800	Inquire to ASTI Factory for alternatives to Mettler-Toledo pH & ORP sensors

Knick	**LEGACY:** Stratos Eco 2402 **MODERN:** Stratos Evo, Stratos Pro A2 pH, Stratos Pro A4 pH, Stratos Eco 2405 pH, Stratos 2221 pH, Stratos Stratos 2231 pH, Protos 3400(X)-035, PHU 3400(X)-110	Inquire to ASTI Factory for alternatives to Knick pH & ORP sensors

Supported Hardware with Known Issues – LIMITED COMPATIBILITY

Manufacturer	pH & ORP Transmitters	OEM pH & ORP Sensors *
HACH (formerly Great Lakes Instruments, a.k.a. GLI)	**LEGACY:** 33, 53, 60, 62, 63, 70, 83, 90, 95, 570, 670, 671, 690, 691, 692, P33, P53, P63 **MODERN:** si792, si794, PRO-P3 GLI PRO series, sc200	**Encap Diff pH Sensors:** 6028P0, 6028P020, 6028P050, 6028P033, 6058P0, 6022P0, 6022P020, 6028P015, 6028P420, 6052P0, 6028P510, 6028P4, 6058P025, 6028P090, 6058P4, 6028P6, 6028P012, 6022P610, 6022P050, 6058P6, 6058P050, 6022P2, 6058P033, 6058P620 **3/4 in Combination pH/ORP Sensors:** PC1R1A, RC1R5N, PC1R2A, PC1R1N, PC1R3A, PC1R1A-V12, PC2K1A, PC2K2A, PC3K2A, PC1R2N, RC2K5N, PC1R1A-STC, RC1R5N-HF **Analog Differential pH/ORP Sensors:** PD1P1, PD1R1, PD2P1, PD1R3, PD1P3, PD3P1, PD2P1A30, PD2P1A50, PD1P1A25, PD2P3, PD1P1-PRO1

NOTES ABOUT SUPPORTED TRANSMITTERS FOR ANALOG ZEUS™ pH SENSORS

The manufacturers and models detailed on this webpage are not a complete listing of the supported OEM pH transmitters, analyzers and controllers to which ZEUS™ pH sensors can retrofit. Please inquire to the ASTI factory to see if your existing pH transmitter can be supported by one of the three analog ZEUS™ pH sensor configurations.

UNIVERSAL AND CONVENTIONAL PREAMPLIFIER CONFIGURATIONS ARE COMPATIBLE WITH ALL OF THE ASTI 2TX, 3TX and 4TX pH TRANSMITTERS

Hook-up details for any ZEUS™ configuration pH sensor to a particular mating OEM pH transmitter can be accessed from the **wiring schematic webpage**.

For any pH transmitter not listed in this table please review our **built-to-order customizable IOTRON™ series pH sensors webpage**.

* ASTI offers pH & ORP sensors compatible with the transmitters listed above as an alternative to mating OEM pH & ORP sensors detailed.

Trademarks (indicated with ™) are registered to the respective corporations as listed above.

Materials of Construction for ZEUS™ pH Sensors
for Inline, Immersion & Submersion Installation

Body Housing RADEL® Poly-Phenyl-Sulfone, PPSU	Reference Junction Support Matrix KYNAR® Poly-Vinylidene-Fluoride, PVDF
RADEL® R-5000 NT Chemical Resistance Chart **RADEL® R-5000 NT Thermal & Mechanical Performance Data**	**KYNAR (PVDF) Chemical Resistance Chart**

RADEL® is a registered trademark of SOLVAY and KYNAR® is a registered trademark of ARKEMA

Last Revised May 3, 2016

⚡ ZEUS™ ⚡ ANALOG pH SENSORS WITH ULTRA-RUGGED CONSTRUCTION

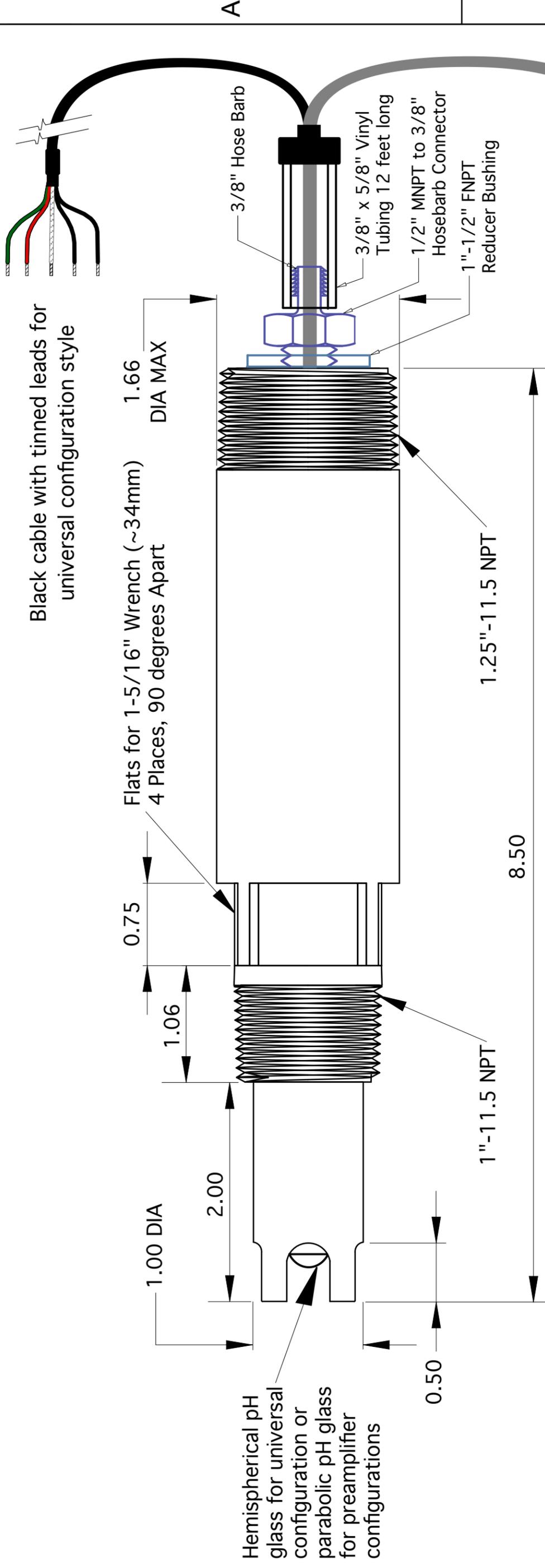|	
Description of Most Important Common Core Features:	**Industrial pH Sensors for Severe Service Inline, Immersion & Submersible Installs** - Waterproofing seal for complete cable isolation for submersion and field washdowns - Solid-state reference nearly impervious to ammonia, chlorine, sulfides & most solvents - ACCU-TEMP Fast Response Pt1000 Temperature Compensation "TC" element - Rugged thick 3.0mm (0.12") protective tines guard configuration, 4 each 90° apart - Thick 5.6mm (0.22") sensor body for 1.66" O.D. to endure tough mechanical wear - Universal configuration 7.6 meters (25 feet), Conventional & Differential Preamplifier Configurations 6 meters (20 feet) of integral cable; Thick PVC jacket for aggressive use
Features for each configuration in addition to common core features itemized to differentiate models.	**ZEUS™ pH SENSOR – UNIVERSAL CONFIGURATION** * Solution ground liquid earth element with Hastelloy C-276 Material of Construction * Tinned lead terminations must be wired directly into transmitter terminals
Universal, Conventional & Differential preamplifier configurations are in stock for smaller orders; Available for **Dispatch on Same Day as Order is Accepted**.	**ZEUS™ pH SENSOR – WITH CONVENTIONAL PREAMPLIFIER** * Integral Analog Conventional Preamplifier for low-noise operation and long cable runs * Waterproof NEMA 6P rated quick disconnect Q7M Snap Corrsion Resistant Connector * Up to 100 meters (330 feet) low-noise preamplified signal using Q7F snap extensions
For larger orders of any configuration please inquire regarding lead time.	**ZEUS™ pH SENSOR – WITH 5-WIRE DIFFERENTIAL PREAMPLIFIER** * Solution ground liquid earth element with Hastelloy C-276 Material of Construction * Integral 5-wire Differential Preamplifier for low-noise operation and long cable runs * Waterproof NEMA 6P quick disconnect HiQ4M Snap Corrsion Resistant Connector * Up to 305 meters (1,000 feet) low-noise preamplified signal with Q7F snap extensions
<u>Process Connections:</u>	1" MNPT Threads on Front for Inline Screw-in Installations 1.25" MNPT Threads on Back for Immersion & Submersible Installations
<u>General Sensor Specifications:</u>	
Operating Temperature Range:	-15 to 150°C
Operating Pressure Range:	1 to **150 psig** (6.9 to 1035 kPa) for **ZEUS™ pH SENSOR UNIVERSAL** 1 to **200 psig** (6.9 to 1379 kPa) for **ZEUS™ pH SENSOR WITH PREAMPLIFIER**
Sensor Body Material: Junction Support Matrix Material: External Dimensional Drawing:	RADEL® R-5000 NT (Poly-Phenyl-Sulfone, PPSU) KYNAR® (Poly-Vinylidene-Fluoride, PVDF) See ZEUS™ Analog pH Sensor 1"-1.25" MNPT Inline / Immersion / Submersible
<u>pH Measurement Specifications:</u>	
Measurement pH Range:	-0.5 to +14.5
Measuring Glass Type:	**Hemispherical** Green Glass (MUGG) - **ZEUS™ UNIVERSAL** **Low-Profile Parabolic** Thick-Wall Break-Resistant **ZEUS™ WITH PREAMPLIFIER**
pH Glass Dimensions:	0.315" (8.0 mm) DIA
Initial Impedance:	< 800 MΩ @ 25 °C for **ZEUS™ UNIVERSAL CONFIGURATION** < 1,500 MΩ @ 25 °C for **ZEUS™ WITH PREAMPLIFIER CONFIGURATIONS**
Sodium Ion Error: Acidic Error:	Less than 0.15 pH in sodium (Na^+) solutions at pH 14.00 Less than 0.05 pH in hydrochloric acid (HCl) solutions at 0.00 pH
<u>Reference System Specifications:</u>	
Type:	Triple Junction Standard
Reference Half Cell:	Ag/AgCl, Saturated KCl
Triple Junction: Primary & Secondary Junctions:	- Solid-State Non-Porous Cross-Linked Polymer embedded in Kynar Support Matrix holds excess KCl assuring saturation at all temps for stability & long sensor service life - Porous Ceramic, Saturated KCl in crosslinked polymer, Interfaced to Triple Junction
<u>Some Selected Examples of Recommended Applications:</u>	Industrial & mining autoclaves, abrasive slurry & high viscosity solutions, sulfide service. Any measurement where aggressive chemical cleaning is needed to remove fouling or low-maintenance operation is required with minimal cleaning and re-calibration. **<u>Not for use in low conductivity, steam sterilization or steam type processes.</u>**
<u>Storage and Shelf Life:</u>	One (1) year from date of dispatch from ASTI factory when stored at indoor ambient room temperature with proper orientation & protector cap.

Black cable with tinned leads for
universal configuration style

3/8" Hose Barb

3/8" x 5/8" Vinyl
Tubing 12 feet long

1/2" MNPT to 3/8"
Hosebarb Connector

1"-1/2" FNPT
Reducer Bushing

1.66
DIA MAX

Flats for 1-5/16" Wrench (~34mm)
4 Places, 90 degrees Apart

1.25"-11.5 NPT

8.50

0.75

1.06

1"-11.5 NPT

2.00

1.00 DIA

0.50

Hemispherical pH
glass for universal
configuration or
parabolic pH glass
for preamplifier
configurations

Gray cable with Snap Connectors
for Preamplifier Configurations

NOTES

1. All dimensions are in inches with tolerances as detailed below
2. Sensor body material of construction is RADEL R-5000 NT
3. Support matrix for solid-state cross-linked conductive polymer
   reference system is KYNAR (PVDF) material of construction
4. Protective tines 4 places, 90 degrees apart, 0.12 inches (3.0mm) thick
5. Black composite cable for universal sensor configuration 25 feet cable length
6. Conventional or 5-wire differential preamplifier configurations use Q7M snap
   connectors with 20 feet cable. Use Q7F snap cable extensions to achieve
   the desired total cable length for field installation.
7. See hook-up schematic to interface tinned leads
   to desired supported mating pH transmitter.
8. Do not use any sensor beyond the factory defined
   maximum temperature or pressure rating.

TITLE
1"-1.25" MNPT Inline / Immersion / Submersible
ZEUS ™ Analog pH Sensor

DRAWING NO.

REV
/

SIZE
B

PROJECT
ULTRA
RUGGED

MODEL Universal or Preamplifier

SHEET   1   OF   1

SCALE   Not to Scale

DRAWN BY
TADP

CHECKED BY
TADP

APPROVED BY
MJP

TOLERANCES

1 Place: ± .1	3 Places: ± .005
2 Places: ±.01	4 Places: ± .0005
Angular: ± 0.25°	

A

B

3

2

1

Connection Diagram of ZEUS™ pH Sensors Item # 1202 for use with pH transmitters that interface Analog pH sensors WITHOUT Preamplifiers

Contact ASTI for terminal assignments to your specific mating pH transmitter

ASTI Cable Color Coding	Instrument Terminal Value	pH Transmitter Terminal (Write below for records)
Clear	**Active pH mV Signal**	
Red	**Reference**	
Black	**Pt1000 TC Element**	
Black	**Pt1000 TC Element**	
Green	**Liquid Earth Solution Ground (Hastelloy® C-276 Alloy)**	
Drain	**Outer Shield**	

Note 1: The liquid earth solution ground may not be used for all pH transmitters. If one is not required simply do not connect the green lead but rather fold it back and tape it off.

Note 2: The outer shield drain connection may not be used for all pH transmitters. If one is not required simply do not connect the green lead but rather fold it back and tape it off.

Note 3: Be sure to select the Pt1000 type input on your transmitter to ensure compatibility with the platinum temperature compensation element in your ZEUS™ pH Sensor.

Note 4: The ZEUS™ pH Sensors Item # 1202 is supplied with 25 feet of integral cable. This cable should not be cut or adulterated in any way. If less cable length is desired you must coil-up any surplus unused cable carefully and secure appropriately. If a cable length longer than 25 feet is required please choose an alternate configuration of the ZEUS™ pH Sensor:

* Item # 1203 for pH transmitters supporting analog conventional preamplifiers (max 330 feet)
* Item # 1204 for pH transmitters supporting analog 5-wire differential preamps (max 1000 feet)
* Item # 1205 smart digital pH sensor for 3TX-HiQ-pH digital transmitters (max 2000 feet)

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Field Installation Guide for Quick Disconnect Q7M & Q7F Snap Connectors for pH, ORP, Ion Selective (ISE) and Dissolved Oxygen (DO) Measurements

Q7M & Q7F SNAP FIELD INSTALLATION SCHEMES – PART 1

Installation approaches for Iotron™ pH, ORP, Ion Selective (ISE) and Dissolved Oxygen (DO) sensors with integral analog preamplifiers with the Q7M & Q7F quick disconnect snap connectors are detailed in this guide.

BASE CONFIGURATIONS FOR SENSORS WITH Q7M CONNECTOR:

All Iotron™ pH, ORP, Ion Selective (ISE) and Dissolved Oxygen (DO) sensors with integral analog preamplifiers can potentially be used with the the Q7M & Q7F quick disconnect snap connectors system. These connectors must be installed at the ASTI factory at the time of fabrication and cannot be added later in the field. Sensors purchased for this installation scheme come standard with 3 meters (10 feet) of integral cable and include quick disconnect male terminated **IP67 & NEMA 6P rugged field ready Q7M quick disconnect snap connector**. The shorter integral cable length of 1.5 meters (5 feet) is also available but there is no difference in cost for this shorter sensor cable lengths. The longer integral cable length of 6 meters (20 feet) is a standard order option whereas 12 meters (40 feet) of integral cable is also available as a special order option. Surcharges apply for both stand order option for the 6m (20 feet) length as well as the special order option 12m (40 feet) integral cable length options.

For each sensor terminated in a Q7M male snap connector there must exist a mating Q7F female snap to tinned leads cable extension. **The Q7M/Q7F connectors are waterproof and corrosion resistant IP67 & NEMA 6P rated when interfaced.** The tinned leads from this cable extensions are wired directly and permanently into the mating transmitter terminal sensor input board terminals (please see the wiring schematic specific to the OEM instrument that you to interface for details). These female snap to tinned leads cable extensions are available in length 1.5 meters (5 feet), 3 meters (10 feet), 6 meters (20 feet), 12 meters (40 feet) as standard order options as well as the longer 24 meters (80 feet) length as a special order option. The best practice for design of a field commissioning scheme employing the Q7M/Q7F connector systemis to use the well stocked standard sensor cable lengths and cable extension options for the lowest cost and best availability installation.

GENERAL NOTE:

The sensor terminations are always male snap connector. The female snap to male snap cable extensions and female snap to tinned leads cable extensions can be used in any combination without signal degradation so long as the maximum supported 100 meters (330 feet) of total cable length is not exceeded. For best result running the cable in conduit for area that may have high levels of noise and RF interference is recommended for best results.

Q7M & Q7F SNAP FIELD INSTALLATION SCHEMES – PART 2

The various standard and special order Q7M & Q7F installation schemes and the corresponding cable length installation achieved for each are detailed below:

Integral Cable Lengths for Sensors Terminated with Q7M Quick Disconnect Snap Connectors

→ Sensors that are terminated with Q7M male snap connector come standard with 3 meters (10 feet) of integral cable

→ Shorter 1.5 meters (5 feet) of integral sensor cable length also terminating with Q7M male snap connector are available for same price as the standard 3 meters (10 feet) length. Specify shorter lengths by –Q7M-1.5m coding. If –Q7M option is invoked without any cable length indicated the sensor is supplied with standard 3 meters (10 feet) of cable & Q7M male snap connector complete.

→ Longer 6 meters (20 feet) integral sensor cable lengths also terminating with Q7M male snap connector are available as a standard order option with applicable surcharge.

→ **Maximum 12 meters (40 feet) of integral sensor cable with Q7M male snap connector is available as a *SPECIAL ORDER OPTION (-Q7M-12m) ALSO WITH APPLICABLE SURCHARGE.***

Q7F Female Snap to Tinned Leads Cable Extension Options
1.5 meters (5 feet)   Q7F-1.5m-TL
3 meters (10 feet)   Q7F -3m-TL
6 meters (20 feet)   Q7F -6m-TL
12 meters (40 feet)   Q7F -12m-TL
24 meters (80 feet)   Q7F -24m-TL – Special Order Option Only

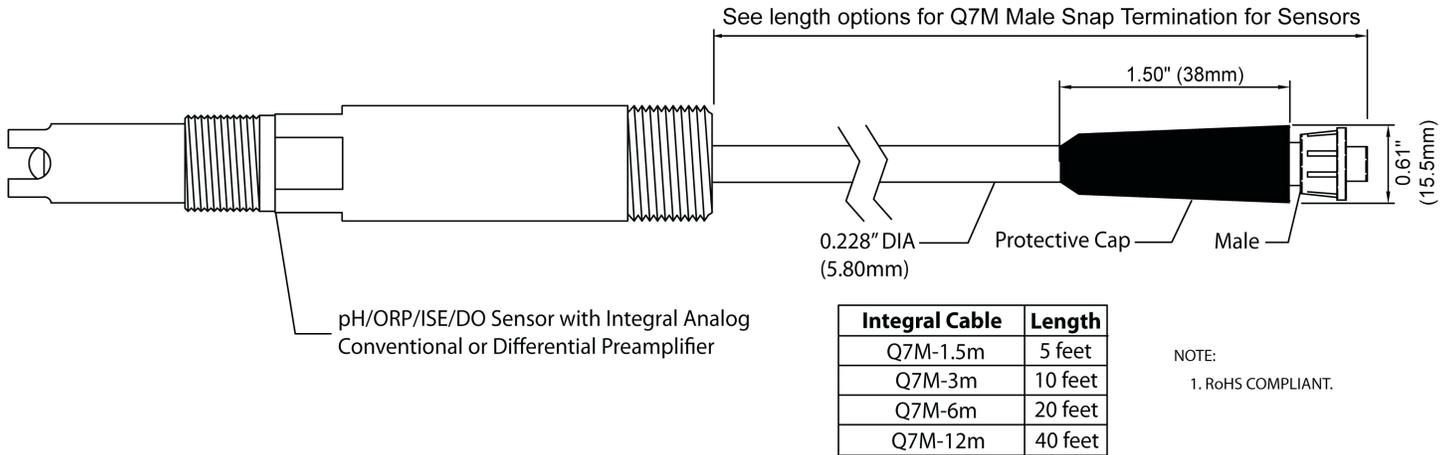**POSSIBLE TOTAL CABLE LENGTH INSTALLATIONS FOR Q7M/Q7F CONNECTOR SYSTEM**

Sensors with Q7M male snap connector and female Q7F snap to tinned leads cable extension

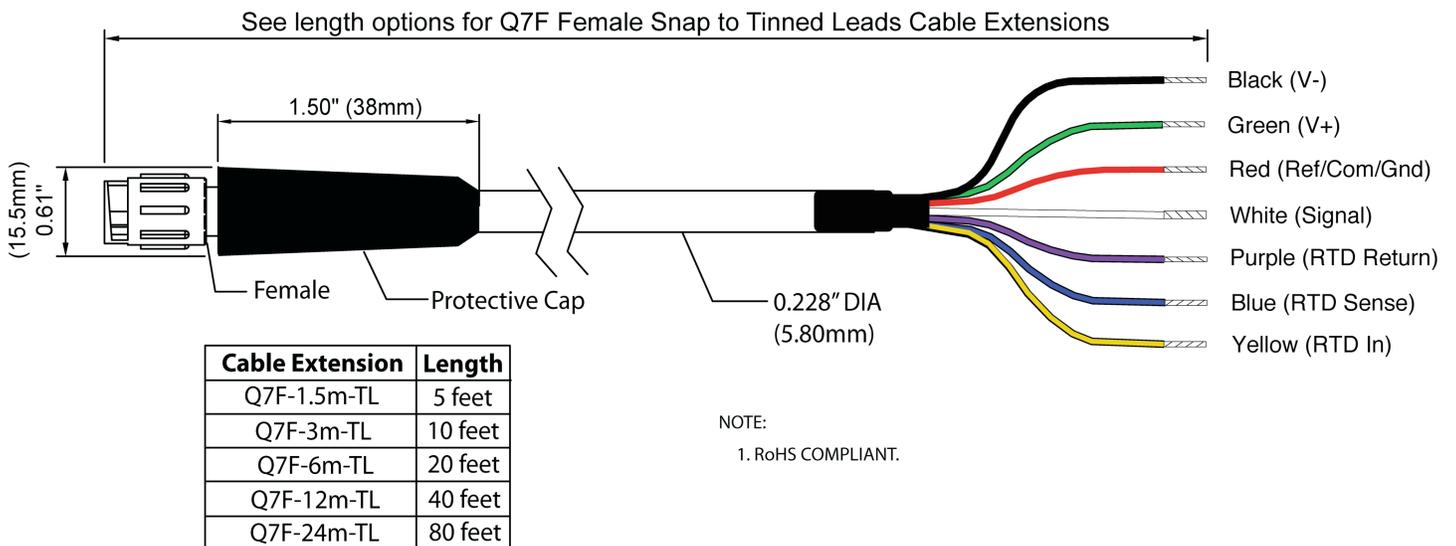|	+1.5 meters	+3 meters	+6 meters	+12 meters	+24 meters
1.5m (5ft) integral cable:	3m (10 feet)	4.5m (15 feet)	7.5m (25 feet)	13.5m (45 feet)	**25.5m (85 feet)**
3m (10 ft) integral cable:	4.5m (15 feet)	6m (20 feet)	9m (30 feet)	15m (50 feet)	**27m (90 feet)**
6m (20 ft) integral cable:	7.5m (25 feet)	9m (30 feet)	12m (40 feet)	18m (60 feet)	**30m (100 feet)**
12m (40 ft) integral cable:	**13.5m (45 feet)**	**15m (50 feet)**	**18m (60 feet)**	**24m (80 feet)**	**36m (120 feet)**

Items denoted in GREEN are special orders. This means that there may be limited availability and/or extended lead times for purchase of these items or to invoke these options. Contact ASTI factory or distributor for further details.

Q7M & Q7F SNAP FIELD INSTALLATION SCHEMES – PART 3

Detail drawing for sensors terminated with Q7M quick disconnect male snap connector (-Q7M-Xm):
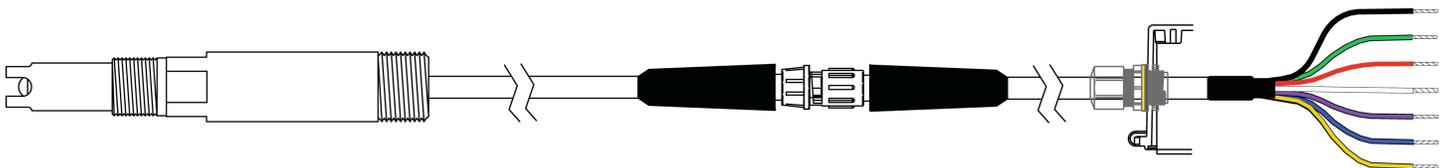
See length options for Q7M Male Snap Termination for Sensors

1.50" (38mm)

0.61" (15.5mm)

0.228" DIA (5.80mm)

Protective Cap

Male

pH/ORP/ISE/DO Sensor with Integral Analog Conventional or Differential Preamplifier

Integral Cable	Length
Q7M-1.5m	5 feet
Q7M-3m	10 feet
Q7M-6m	20 feet
Q7M-12m	40 feet

NOTE:
1. RoHS COMPLIANT.

Detail drawing for female snap to tinned leads Q7F-Xm-TL cable extensions:

See length options for Q7F Female Snap to Tinned Leads Cable Extensions

1.50" (38mm)

(15.5mm) 0.61"

Black (V-)
Green (V+)
Red (Ref/Com/Gnd)
White (Signal)
Purple (RTD Return)
Blue (RTD Sense)
Yellow (RTD In)

Female

Protective Cap

0.228" DIA (5.80mm)

Cable Extension	Length
Q7F-1.5m-TL	5 feet
Q7F-3m-TL	10 feet
Q7F-6m-TL	20 feet
Q7F-12m-TL	40 feet
Q7F-24m-TL	80 feet

NOTE:
1. RoHS COMPLIANT.

Assembly Drawing for Q7M & Q7F Style Quick Disconnect Field Installation Scheme:
Sensor with Q7M male snap connector bridged with female snap to tinned leads (Q7F-Xm-TL) cable extension. The tinned leads are interfaced to transmitter terminals. Sealing cable gland used on transmitter enclosure for watertight connection.

Last Modified November 20, 2015 | Revision 1

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Field Installation Guide for Quick Disconnect Q7M & Q7F Snap Connectors for pH Sensors & ORP Sensors with 5-Wire Differential Type Analog Preamplifiers

Q7M & Q7F SNAP FIELD INSTALLATION SCHEMES – PART 1

Installation of the Iotron™ pH sensors and ORP sensors with integral 5-wire differential analog preamplifiers with the Q7M & Q7F quick disconnect snap connectors is detailed in this guide.

BASE CONFIGURATIONS FOR SENSORS WITH Q7M CONNECTOR:

All Iotron™ pH sensors and ORP sensors with integral 5-wire differential analog preamplifiers can potentially be used with the the Q7M & Q7F quick disconnect snap connectors system. These connectors must be installed at the ASTI factory at the time of fabrication and cannot be added later in the field. Sensors purchased for this installation scheme come standard with 3 meters (10 feet) of integral cable and include quick disconnect male terminated **IP67 & NEMA 6P rugged field ready Q7M quick disconnect snap connector**. The shorter integral cable length of 1.5 meters (5 feet) is also available but there is no difference in cost for this shorter sensor cable lengths. The longer integral cable length of 6 meters (20 feet) is a standard order option whereas 12 meters (40 feet) of integral cable is also available as a special order option. Surcharges apply for both stand order option for the 6m (20 feet) length as well as the special order option 12m (40 feet) integral cable length options.

For each sensor terminated in a Q7M male snap connector there must exist a mating Q7F female snap to tinned leads cable extension. **The Q7M/Q7F connectors are waterproof and corrosion resistant IP67 & NEMA 6P rated when interfaced.** The tinned leads from this cable extensions are wired directly and permanently into the mating transmitter terminal sensor input board terminals (please see the wiring schematic specific to the OEM instrument that you to interface for details). These female snap to tinned leads cable extensions are available in length 1.5 meters (5 feet), 3 meters (10 feet), 6 meters (20 feet), 12 meters (40 feet) as standard order options as well as the longer 24 meters (80 feet) length as a special order option. The best practice for design of a field commissioning scheme employing the Q7M/Q7F connector systemis to use the well stocked standard sensor cable lengths and cable extension options for the lowest cost and best availability installation.

GENERAL NOTE:

The sensor terminations are always male snap connector. The female snap to male snap cable extensions and female snap to tinned leads cable extensions can be used in any combination without signal degradation so long as the maximum supported 305 meters (1,000 feet) of total cable length is not exceeded. For best result running the cable in conduit for area that may have high levels of noise and RF interference is recommended for best results.

Q7M & Q7F SNAP FIELD INSTALLATION SCHEMES – PART 2

The various standard and special order Q7M & Q7F installation schemes and the corresponding cable length installation achieved for each are detailed below:

Integral Cable Lengths for Sensors Terminated with Q7M Quick Disconnect Snap Connectors

→ Sensors that are terminated with Q7M male snap connector come standard with 3 meters (10 feet) of integral cable

→ Shorter 1.5 meters (5 feet) of integral sensor cable length also terminating with Q7M male snap connector are available for same price as the standard 3 meters (10 feet) length. Specify shorter lengths by –Q7M-1.5m coding. If –Q7M option is invoked without any cable length indicated the sensor is supplied with standard 3 meters (10 feet) of cable & Q7M male snap connector complete.

→ Longer 6 meters (20 feet) integral sensor cable lengths also terminating with Q7M male snap connector are available as a standard order option with applicable surcharge.

→ **Maximum 12 meters (40 feet) of integral sensor cable with Q7M male snap connector is available as a *SPECIAL ORDER OPTION (-Q7M-12m) ALSO WITH APPLICABLE SURCHARGE.***

Q7F Female Snap to Tinned Leads Cable Extension Options
1.5 meters (5 feet)	Q7F-1.5m-TL
3 meters (10 feet)	Q7F -3m-TL
6 meters (20 feet)	Q7F -6m-TL
12 meters (40 feet)	Q7F -12m-TL
24 meters (80 feet)	**Q7F -24m-TL – Special Order Option Only**

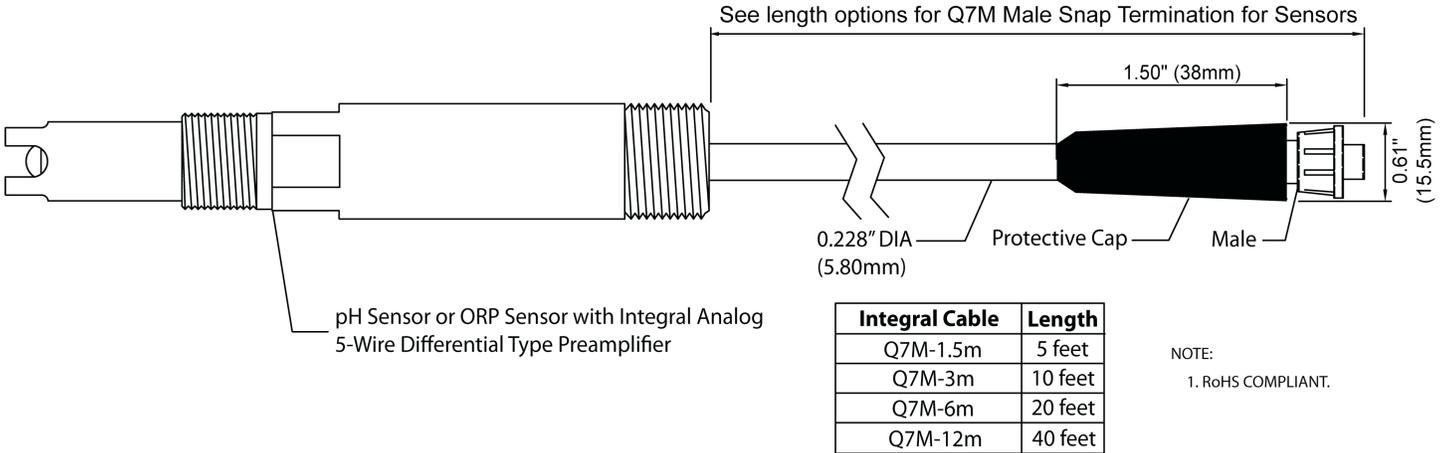### POSSIBLE TOTAL CABLE LENGTH INSTALLATIONS FOR Q7M/Q7F CONNECTOR SYSTEM

Sensors with Q7M male snap connector and female Q7F snap to tinned leads cable extension

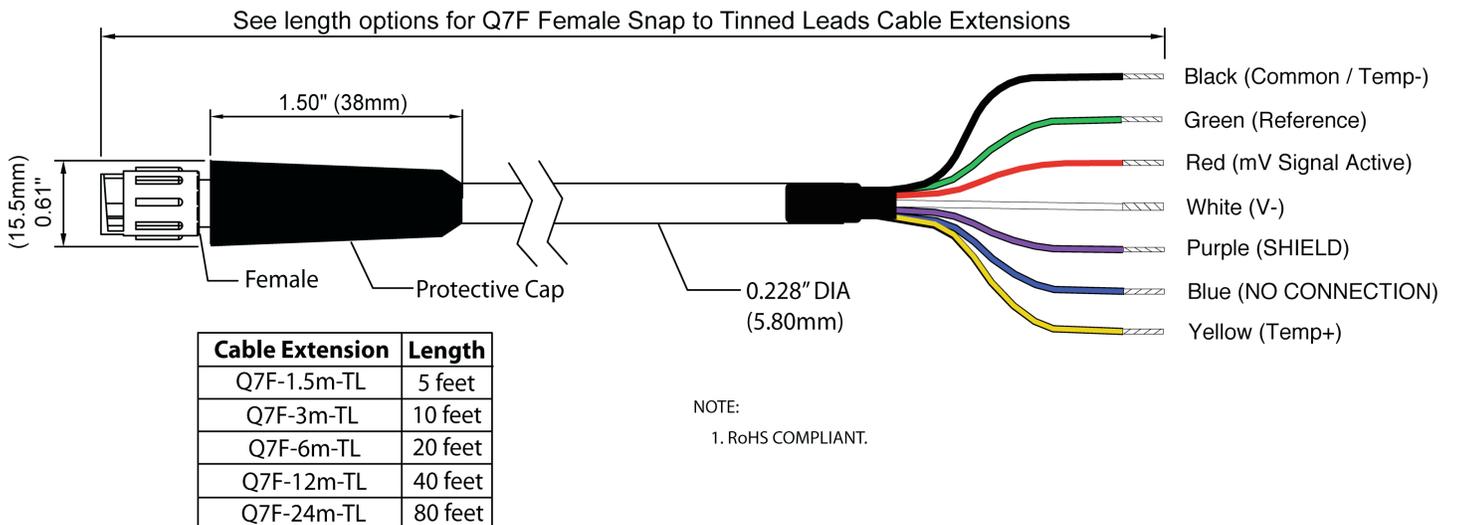|	**+1.5 meters**	**+3 meters**	**+6 meters**	**+12 meters**	**+24 meters**
1.5m (5ft) integral cable:	3m (10 feet)	4.5m (15 feet)	7.5m (25 feet)	13.5m (45 feet)	**25.5m (85 feet)**
3m (10 ft) integral cable:	4.5m (15 feet)	6m (20 feet)	9m (30 feet)	15m (50 feet)	**27m (90 feet)**
6m (20 ft) integral cable:	7.5m (25 feet)	9m (30 feet)	12m (40 feet)	18m (60 feet)	**30m (100 feet)**
12m (40 ft) integral cable:	**13.5m (45 feet)**	**15m (50 feet)**	**18m (60 feet)**	**24m (80 feet)**	**36m (120 feet)**

Items denoted in GREEN are special orders. This means that there may be limited availability and/or extended lead times for purchase of these items or to invoke these options. Contact ASTI factory or distributor for further details.

Q7M & Q7F SNAP FIELD INSTALLATION SCHEMES – PART 3

Detail drawing for sensors terminated with Q7M quick disconnect male snap connector (-Q7M-Xm):

See length options for Q7M Male Snap Termination for Sensors

1.50" (38mm)

0.61" (15.5mm)

0.228" DIA (5.80mm)

Protective Cap

Male

pH Sensor or ORP Sensor with Integral Analog 5-Wire Differential Type Preamplifier

Integral Cable	Length
Q7M-1.5m	5 feet
Q7M-3m	10 feet
Q7M-6m	20 feet
Q7M-12m	40 feet

NOTE:
1. RoHS COMPLIANT.

Detail for female snap to tinned leads Q7F-Xm-TL cable extensions for 5-wire differential analog preamplifiers:

See length options for Q7F Female Snap to Tinned Leads Cable Extensions

1.50" (38mm)

(15.5mm) 0.61"

Female

Protective Cap

0.228" DIA (5.80mm)

Black (Common / Temp-)
Green (Reference)
Red (mV Signal Active)
White (V-)
Purple (SHIELD)
Blue (NO CONNECTION)
Yellow (Temp+)

Cable Extension	Length
Q7F-1.5m-TL	5 feet
Q7F-3m-TL	10 feet
Q7F-6m-TL	20 feet
Q7F-12m-TL	40 feet
Q7F-24m-TL	80 feet

NOTE:
1. RoHS COMPLIANT.

Assembly Drawing for Q7M & Q7F Style Quick Disconnect Field Installation Scheme:
Sensor with Q7M male snap connector bridged with female snap to tinned leads (Q7F-Xm-TL) cable extension. The tinned leads are interfaced to transmitter terminals. Sealing cable gland used on transmitter enclosure for watertight connection.

Last Modified November 28, 2015 | Revision 1
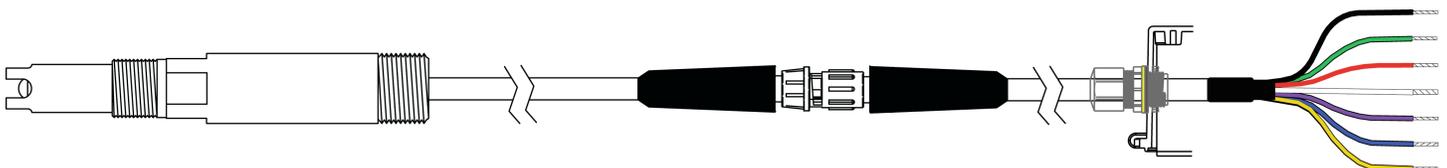
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⚡ ZEUS™ ⚡ SMART DIGITAL pH SENSORS WITH ULTRA-RUGGED CONSTRUCTION FOR TOUGH PROCESS MEASUREMENT APPLICATIONS

Description of Most Important Common Core Features:

Industrial pH Sensors for Severe Service Inline, Immersion & Submersible Installs
- Waterproofing seal for complete cable isolation for submersion and field washdowns
- Solid-state reference nearly impervious to ammonia, chlorine, sulfides & most solvents
- ACCU-TEMP Fast Response Pt1000 Temperature Compensation "TC" element
- Rugged thick 3.0mm (0.12") protective tines guard configuration, 4 each 90° apart
- Thick 5.6mm (0.22") sensor body for 1.66" O.D. to endure tough mechanical wear
- Standard 6 meters (20 feet) of integral cable with thick PVC jacket for aggressive use

FEATURES SPECIFIC TO SMART DIGITAL ZEUS™ CONFIGURATION

Smart Digital Configuration of ZEUS™ pH Sensors:
Short lead times for urgent commissioning of new systems or replacement of existing installs with very robust & advanced digital pH measurement technology

* Integral smart digital board stores calibrations & transmitter configuration in sensor
* Waterproof NEMA 6P quick disconnect HiQ4M Snap Corrsion Resistant Connector
* Up to 610 meters (2,000 feet) noise insensitive digital cable with HiQ4F extensions
* True plug and play sensor with automatic loading of calibration values for hot-swap
* Calibrate conveniently in lab or shop and install quick-disconnect sensor in the field
* Advanced autoread algorithm for reproducible & operator independent calibrations
* Automatic recognition of 4.00, 6.86, 7.00, 9.18 & 10.00 NIST traceable pH buffers with built-in correction for temperature induced changes to pH buffer value
* Reliable readings in acidic or alkaline range with 1-point, 2-point or 3-point calibrations
* Calibrate with sophisticated HiQ Windows software or any 3TX-HiQ-pH transmitter
* Entire transmitter configuration can be downloaded to sensor or uploaded from sensor to intelligent 3TX-HiQ-pH transmitter for advanced management of field installations
* Stores last five offset (1-point), slope (2-point & 3-point) and temperature calibrations
* See 3TX-HiQ documentation for complete set of smart digital features & functionality

Process Connections:

1" MNPT Threads on Front for Inline Screw-in Installations
1.25" MNPT Threads on Back for Immersion & Submersible Installations

General Sensor Specifications:

Operating Temperature Range:

-15 to +150°C for Inline/Immersion Use (Max +85°C for fully submersible installations)

Operating Pressure Range:

1 to **200 psig** (6.9 to 1379 kPa)

Sensor Body Material:
Junction Support Matrix Material:
External Dimensional Drawing:

RADEL® R-5000 NT (Poly-Phenyl-Sulfone, PPSU)
KYNAR® (Poly-Vinylidene-Fluoride, PVDF)
See ZEUS™ Digital pH Sensor 1"-1.25" MNPT Inline / Immersion / Submersible

pH Measurement Specifications:

Measurement pH Range:

-0.5 to +14.5

Measuring Glass Type:

Low-Profile Parabolic, Thick-Wall Break-Resistant

pH Glass Dimensions:

0.315" (8.0 mm) DIA

Initial Impedance:

< 1,500 MΩ @ 25 °C

Sodium Ion Error:
Acidic Error:

Less than 0.15 pH in sodium (Na^+) solutions at pH 14.00
Less than 0.05 pH in hydrochloric acid (HCl) solutions at 0.00 pH

Reference System Specifications:

Type:

Triple Junction Standard

Reference Half Cell:

Ag/AgCl, Saturated KCl

Triple Junction:
Primary & Secondary Junctions:

- Solid-State Non-Porous Cross-Linked Polymer embedded in Kynar Support Matrix holds excess KCl assuring saturation at all temps for stability & long sensor service life
- Porous Ceramic, Saturated KCl in crosslinked polymer, Interfaced to Triple Junction

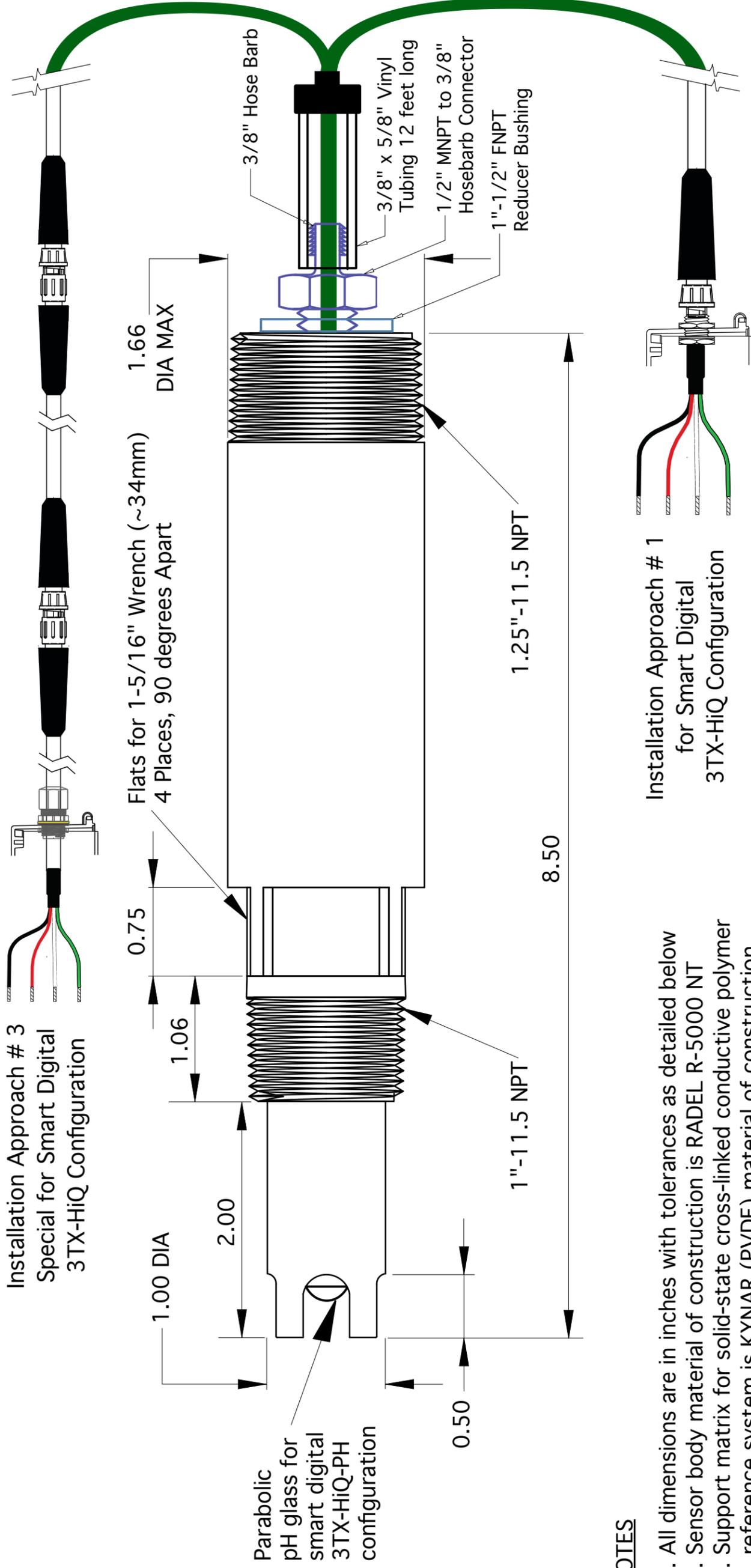**Some Selected Examples of Recommended Applications:**

Industrial & mining autoclaves, abrasive slurry & high viscosity solutions, sulfide service. Any measurement where aggressive chemical cleaning is needed to remove fouling or low-maintenance operation is required with minimal cleaning and re-calibration. **Not for use in low conductivity, steam sterilization or steam type processes.**

Storage and Shelf Life:

One (1) year from date of dispatch from ASTI factory when stored at indoor ambient room temperature with proper orientation & protector cap.

Installation Approach # 3
Special for Smart Digital
3TX-HiQ Configuration

3/8" Hose Barb

3/8" x 5/8" Vinyl
Tubing 12 feet long

1/2" MNPT to 3/8"
Hosebarb Connector

1"-1/2" FNPT
Reducer Bushing

1.66
DIA MAX

Flats for 1-5/16" Wrench (~34mm)
4 Places, 90 degrees Apart

1.25"-11.5 NPT

8.50

0.75

1.06

2.00

1.00 DIA

1"-11.5 NPT

0.50

Parabolic
pH glass for
smart digital
3TX-HiQ-PH
configuration

Installation Approach # 1
for Smart Digital
3TX-HiQ Configuration

NOTES

1. All dimensions are in inches with tolerances as detailed below
2. Sensor body material of construction is RADEL R-5000 NT
3. Support matrix for solid-state cross-linked conductive polymer
   reference system is KYNAR (PVDF) material of construction
4. Protective tines 4 places, 90 degrees apart, 0.12 inches (3.0mm) thick
5. Smart digital 3TX-HiQ-pH configuration uses HiQ4M quick disconnect
   snap connector with 20 feet cable. Use HiQ4F snap cable extensions
   to achieve desired total cable length for field install.
7. See hook-up schematic to interface tinned leads
   to mating 3TX-HiQ-pH intelligent pH transmitter.
8. Do not use any sensor beyond the factory defined
   maximum temperature or pressure rating.

Advanced Sensor Technologies U.S.A.
Website: http://www.astisensor.com

ZEUS™ Digital pH Sensor

TITLE
1"-1.25" MNPT Inline / Immersion / Submersible

DRAWING NO.

MODEL: Smart Digital 3TX-HiQ-pH

PROJECT
ULTRA
RUGGED

SIZE
B

SCALE Not to Scale

REV
/

SHEET 1 OF 1

DRAWN BY
TADP

CHECKED BY
TADP

APPROVED BY
MJP

TOLERANCES

1 Place: ± .1	3 Places: ± .005
2 Places: ± .01	4 Places: ± .0005
Angular: ± 0.25°	

3TX-HiQ Intelligent Transmitters for Smart Digital Sensors Measurement Platform Recommended Field Installation Guide

Tinned leads connected to the 3TX-HiQ can be from:

- "A" - leads from panel mount connector installed into transmitter enclosure (done at ASTI factory) *or*
- "B" - female snap to tinned lead cable extensions with sealing glands installed into transmitter enclosure (done either at install site or time of commssioning).
- In "A" or "B" installation approach above the wiring to transmitter need be done only once. Subsequent sensor exchanges in field for cleaning, recalibration or replacement do not require interfacing with the input terminals on the transmitter board in any manner.

Wiring of Tinned Leads to 3TX-HiQ Transmitter
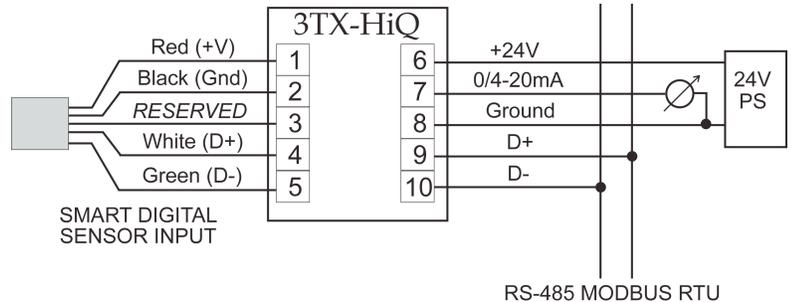
FIELD INSTALLATION SCHEMES – PART 1

Please review the first two pages of the 3TX FAQ before wiring-up or powering on any of the 3TX modules.

Installation approaches for genuine Smart Digital Iotron™ pH & ORP type HiQ sensors are detailed in the following pages.

BASE HiQ pH & ORP SENSOR CONFIGURATION:

All smart digital Iotron™ pH and ORP HiQ style sensors for use with 3TX-HiQ-pH transmitters come standard with 6 meters (20 feet) of integral cable and include quick disconnect male terminated IP67 & NEMA 6P rugged field ready connector. Shorter cable lengths of 1.5 meters (5 feet) and 3 meters (10 feet) are also available but there is no difference in cost for these shorter sensor cable lengths.

Installation requiring cable runs longer than 6 meters (20 feet) can be achieved using the approach #2 & #3 options for field installation detailed below. Best practice is to use the well stocked standard sensor cable lengths and cable extension options for the lowest cost and best availability of your 3TX-HiQ-pH installation. Longer cable lengths can also be achieved by use of the **special order options indicated in green** in PART 2 of this guide but this approach may lead to longer lead times for fabrication.

Approach # 1
Directly connect male snap termination of smart sensor to female panel mount installed on 3TX-HiQ transmitter enclosure
→ Length of cable ordered for sensor must be sufficient to interface to enclosure for this approach. Standard 6 meter length (20 feet) with optional shorter 3 meters (10 feet), 1.5 meters (5 foot) lengths also available for the exact same HiQ option adder cost.

Aproach # 2
Use snap to snap cable extensions terminating into female panel mount plug installed on 3TX-HiQ transmitter enclosure
→ Length of cable between sensor and snap to snap cable extension(s) must be sufficient to interface to enclosure for this apporach. The use of multiple snap to snap cable extenions is ASTI factory supported and will not result in signal degradation so long as the maximum 610 meters (2,000 feet) of total cable length is not exceeded.

Approach # 3
Use female snap to tinned leads cable extensions with sealing cable glands installed into enclosure for 3TX-HiQ transmitter
→ Female snap to tinned lead cable extensions can be mated with the sensor male snap connector or else to a snap to snap cable extension. If the female snap to tinned leads cable extensions is employed, it should always be used as the final portion of the installation so that this cable interface the 3TX-HiQ transmitter input terminal board (see wiring schematic option "B" above).

GENERAL NOTE:
The sensor terminations are always male snap connector. The female snap to male snap cable extensions and female snap to tinned leads cable extensions can be used in any combination without signal degradation so long as the maximum supported 610 meters (2,000 feet) of total cable length is not exceeded.

FIELD INSTALLATION SCHEMES – PART 2

Find detailed below the standard and special order cable length installation options using the HiQ smart digital platform.

Integral Cable Length Options for HiQ Sensors
→ All HiQ style sensors come standard with male snap connector. Standard integral cable length is 6 meters (20 feet).
→ Shorter 3 meters (10 feet) or 1.5 meters (5 feet) integral sensor cable lengths also terminating with male snap connector available for same price as standard 6 meter (20 foot) length. Specify shorter lengths by –HiQ-1.5m or –HiQ-3.0m coding. If standard –HiQ option is invoked the sensor is supplied with standard 6 meters (20 feet) of cable & male snap connector.
→ **12 meters (40 feet) of integral sensor cable with male snap connector available as a *special order option (-HiQ-12m)*.**

Female Snap to Male Snap Cable Extension Options
3 meters (10 feet)　　　HiQ4F-3m-HiQ4M
6 meters (20 feet)　　　HiQ4F-6m-HiQ4M
12 meters (40 feet)　　HiQ4F-12m-HiQ4M
24 meters (80 feet)　　HiQ4F-24m-HiQ4M – Special Order Option Only

Female Snap to Tinned Leads Cable Extension Options
1.5 meters (5 feet)　　　HiQ4F-1.5m-TL
3 meters (10 feet)　　　HiQ4F-3m-TL
6 meters (20 feet)　　　HiQ4F-6m-TL
12 meters (40 feet)　　HiQ4F-12m-TL – Special Order Option Only

POSSIBLE TOTAL CABLE LENGTH INSTALLATIONS USING APPROACH #1, #2 or #3

Approach # 1: Sensor with integral cable only with male snap connected directly to female panel mount:
STANDARD is 6m (20ft) with shorter 1.5 meters (5 feet), 3 meters (10 feet) cable lengths also available for same price
→ **12m (40ft) integral cable length terminating with male snap connector also available as Special Order Option**

Approach # 2: Sensor with integral cable and female to male snap cable extension connected to female panel mount:

	+3 meters	+6 meters	+12 meters	+24 meters
With 1.5m (5ft) integral sensor cable:	4.5m (15 feet)	7.5m (15 feet)	13.5m (45 feet)	**25.5m (85 feet)**
With 3m (10 ft) integral sensor cable:	6.0m (20 feet)	9.0m (30 feet)	15m (50 feet)	**27.0m (90 feet)**
With 6m (20 ft) integral sensor cable:	9.0m (30 feet)	12m (40 feet)	18m (60 feet)	**30.0m (100 feet)**
With 12m (40 ft) integral sensor cable:	**15m (50 feet)**	**18m (60 feet)**	**24m (80 feet)**	**36.0m (120 feet)**

Approach # 3: Sensors with integral cable and female snap to tinned leads cable extension to 3TX-HiQ input terminals:
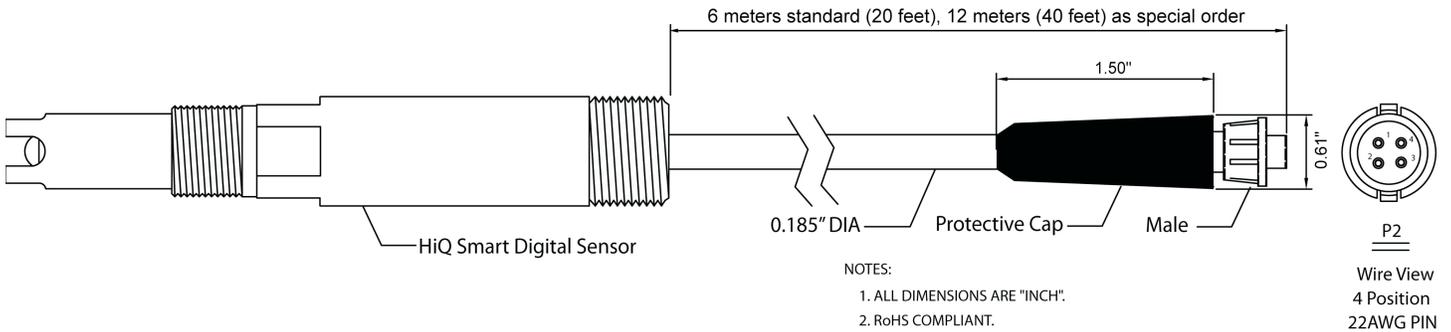
	+1.5 meters	+3 meters	+6 meters	+12 meters
With 1.5m (5ft) integral sensor cable:	3m (10 feet)	4.5m (15 feet)	7.5m (15 feet)	**13.5m (45 feet)**
With 3m (10 ft) integral sensor cable:	4.5m (15 feet)	6m (20 feet)	9m (30 feet)	**15m (50 feet)**
With 6m (20 ft) integral sensor cable:	7.5m (15 feet)	9m (30 feet)	12m (40 feet)	**18m (60 feet)**
With 12m (40 ft) integral sensor cable:	**9m (30 feet)**	**12m (40 feet)**	**18m (60 feet)**	**24m (80 feet)**

Standard installations requiring cable lengths longer than 18 meters (60 feet) or special order style installations requiring cable lengths longer than 36 meters (120 feet) are achieved by using multiple female snap to male snap cable extensions. This can increase the total cable length in increments or 3m (10 feet), 6m (20 feet) & 12m (40 feet) or 24m (80 feet) with special order snap to snap cable extensions. The snap to snap & snap to tinned leads cable extensions can be used together in any combination without signal degradation provided the maximum supported 610 meters (2,000 feet) total cable length is not exceeded.
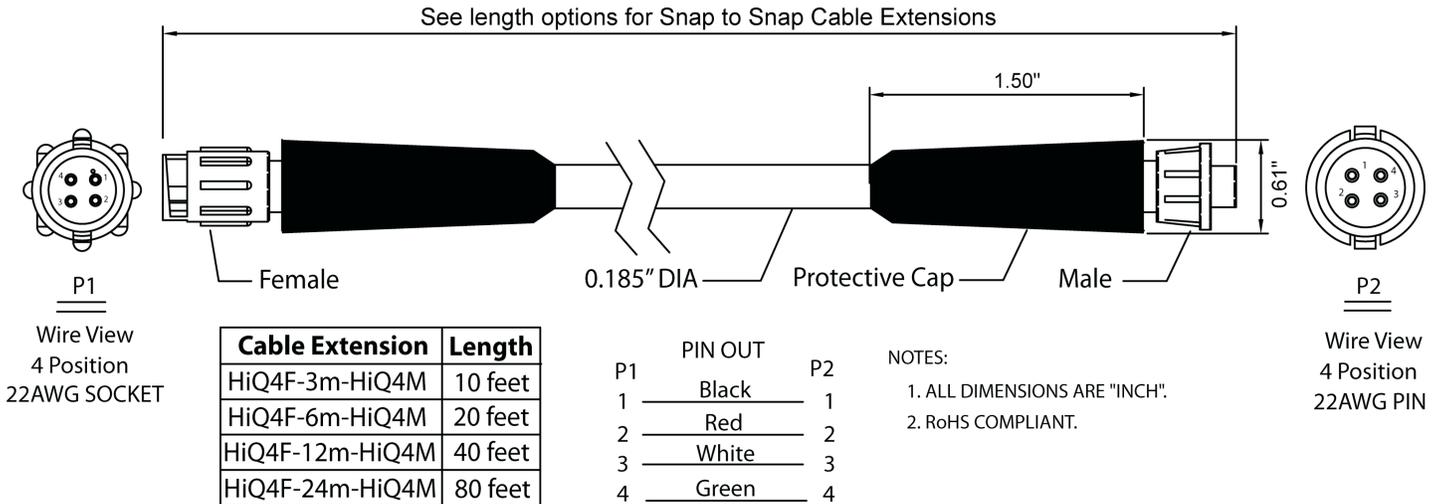
Items denoted in GREEN are special orders. This means that there may be limited availability and/or extended lead times for purchase of these items or to invoke these options. Contact ASTI factory or distributor for further details.
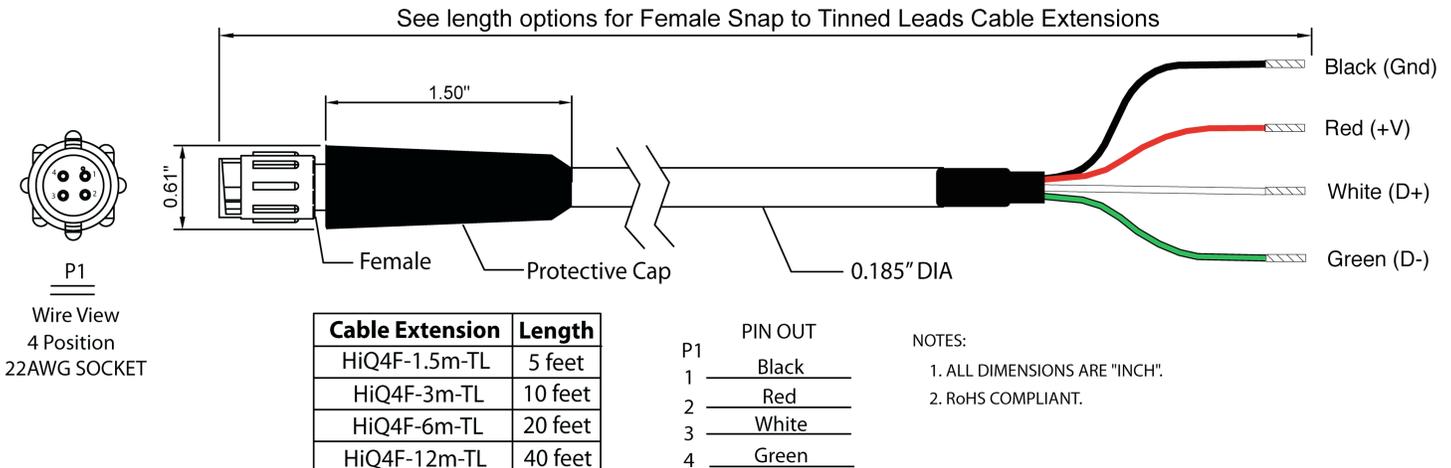
FIELD INSTALLATION SCHEMES – PART 3

Detail drawing for standard smart digital HiQ sensor male snap connector cable termination (-HiQ-Xm):

6 meters standard (20 feet), 12 meters (40 feet) as special order

1.50"

0.61"

HiQ Smart Digital Sensor

0.185" DIA — Protective Cap — Male

NOTES:
1. ALL DIMENSIONS ARE "INCH".
2. RoHS COMPLIANT.

P2

Wire View
4 Position
22AWG PIN

Detail drawing for female snap to male snap HiQ4F-Xm-HiQ4M cable extensions:

See length options for Snap to Snap Cable Extensions

1.50"

0.61"

Female

0.185" DIA — Protective Cap — Male

P1

Wire View
4 Position
22AWG SOCKET

Cable Extension	Length
HiQ4F-3m-HiQ4M	10 feet
HiQ4F-6m-HiQ4M	20 feet
HiQ4F-12m-HiQ4M	40 feet
HiQ4F-24m-HiQ4M	80 feet

PIN OUT

P1		P2
1	Black	1
2	Red	2
3	White	3
4	Green	4

NOTES:
1. ALL DIMENSIONS ARE "INCH".
2. RoHS COMPLIANT.

P2

Wire View
4 Position
22AWG PIN

Detail drawing for female snap to tinned leads HiQ4F-Xm-TL cable extensions:

See length options for Female Snap to Tinned Leads Cable Extensions

1.50"

0.61"

Black (Gnd)

Red (+V)

White (D+)

Green (D-)

Female — Protective Cap — 0.185" DIA

P1

Wire View
4 Position
22AWG SOCKET

Cable Extension	Length
HiQ4F-1.5m-TL	5 feet
HiQ4F-3m-TL	10 feet
HiQ4F-6m-TL	20 feet
HiQ4F-12m-TL	40 feet

PIN OUT

P1	
1	Black
2	Red
3	White
4	Green

NOTES:
1. ALL DIMENSIONS ARE "INCH".
2. RoHS COMPLIANT.

FIELD INSTALLATION SCHEMES – PART 4

The terminal assignments for red, black, white & green colored leads are detailed on page 1 of this installation guide. Care should be taken when making these connections to follow the terminal assignments exactly to avoid damaging the HiQ sensor or transmitter. No connection of any kind should be made to the factory-reserved input terminal 3.

Assembly Drawing for Installation Approach # 1:

Smart digital HiQ sensor with male snap connector is interfaced directly to female panel mount snap connector that has been installed into enclosure assembly. This approach requires the max distance between sensor & transmitter is no more than 6 meters (20 feet) for the standard digital HiQ sensors or 12 meters (40 feet) for the special order long cable version.
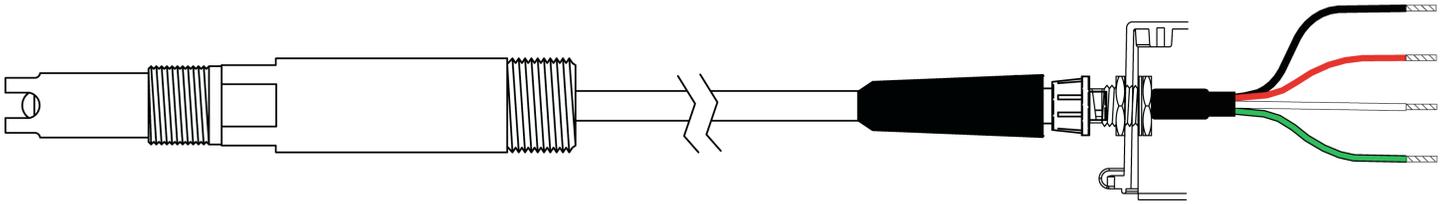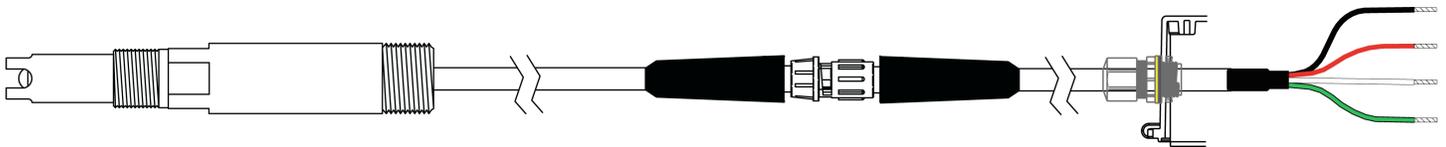
Assembly Drawing for Installation Approach # 2:

Smart digital HiQ sensor terminated with male snap connector is bridged with snap to snap (HiQ4F-Xm-HiQ4M) cable extension which is interfaced to female panel mount snap connector that has been installed into enclosure assembly. Multiple snap-to-snap extension cables can be employed as desired at time of commissioning or any time thereafter.

Assembly Drawing for Installation Approach # 3:

Smart digital HiQ sensor terminated with male snap connector is bridged with snap to tinned leads (HiQ4F-Xm-TL) cable extension. The tinned leads are interfaced to 3TX-HiQ terminals & sealing cable gland is installed in enclosure assembly to secure the cable. This approach is typically used for retrofit installation where a cable gland has already been installed.

Assembly Drawing for Installation Approach # 3 (Special)

Smart digital HiQ sensor terminated with male snap connector is bridged with both snap to snap (HiQ4F-Xm-HiQ4M) cable extension and snap to tinned leads (HiQ4F-Xm-TL) cable extensions. The tinned leads are ultimately interfaced to 3TX-HiQ terminals and sealing cable gland is installed in enclosure assembly. See page 1 for terminal assignments.

3TX-HiQ Digital Measurement System
Troubleshooting Guide & FAQ

!!! WARNING !!!
The 3TX-HiQ digital transmitters are ONLY for use with genuine ASTI supplied IOTRON™ smart digital HiQ sensors. Connecting any other sensor (analog or digital) may permanently damage the 3TX-HiQ transmitter and/or improper sensor. If there should be any doubt as to whether you are connecting a genuine ASTI supplied IOTRON™ HiQ digital sensor to the 3TX-HiQ digital transmitter, please inquire to the ASTI factory for verification.

The smart digital HiQ sensors are designed for a seamless and simple plug and play type operation with the intelligent digital 3TX-HiQ transmitters. In the case that any exception occurs a variety of diagnostic information may be displayed in the form of error codes reported on the 3TX-HiQ LED display. Instructions about what should be done if any of these error codes or diagnostic messages are displayed is provided below to assist with troubleshooting initial commissioning as well as ongoing maintenance of your installation.

The troubleshooting steps below are meant for use together with the specific 3TX-HiQ transmitter documentation in question as well the general shared 3TX FAQ documentation rather than just as a standalone guide. Error codes are shown flashing on the display in the format "X.Y" where "X" is from 1 to 10 and "Y" can vary from 0 to 9. The exact coding designations are generally only relevant for internal uses by the ASTI factory. In particular the "Y" portion of the error code can be safely ignored unless specifically requested for remote diagnostic troubleshooting assistance purposes.

NO SENSOR CONNECTED OR IMPROPER WIRING ERRORS

If no genuine IOTRON™ smart digital HiQ digital sensor is connected, it is expected that one or more error will be reported including the 2.Y type error code. If there is an HiQ digital sensor connected but it is not interfaced to the correct type of mating HiQ transmitter you will get a 3.Y measurement type mismatch error. It is very important to make sure that the four leads from the smart digital HiQ sensor are properly wired to the terminals on the 3TX-HiQ transmitter to prevent damage to the electronics. Please see page one (1) for the color coding and terminal designations of the four leads. Since the HiQ digital measurement system employs a NEMA 6P rated quick disconnect termination, the tinned lead connections need only be made correctly once to the HiQ transmitter.

COMMUNICATION ERRORS

If an HiQ digital sensor is properly connected and an error code of the type 1.Y, 4.Y, 5.Y , 6.Y, 9.Y or 10.Y is received then these indicate that some form of a communication exception has occured. Such errors are quite rare. If observed at all they are typically quite brief in duration signifying a very brief transient temporary communication issue. If these error codes starting with 1, 4, 5, 6 or 9 persist this indicates that there was some damage to the electronics inside the HiQ digital sensor and it must be replaced. Typically some ground loop or electrical/installation issue is responsible for this damage.

DATE STAMPING ERRORS

If an error code of the type 7.Y or 8.Y is received then these indicate that some form of an error has occurred related to setting the field activation or the last date of field use. These errors are also extraordinarily rare and indicate either an improper configuration or else a corruption to that portion of the EEPROM (very unlikely). If the issue is simply an improper configuration this can be resolved at the ASTI factory. The sensor item number, serial number, invoice number and dispatch date will be requested for approval of any such return. All of this information can be obtained from the HiQ transmitter to which the digital sensor is connected by looking at the appropriate parameters (see transmitter manual).

GENERAL TROUBLESHOOTING TIPS

- Ensure that all snap connections with the extension cables are secure and that none of the pins are damaged.
- Ensure that there is good ingerity of PVC insulation on leads & cable jacket for both sensor and/or extension cables.
- Disconnect and reconnect the digital sensor via the snap connection. Allow ~5 to 10 seconds before reconnecting.
- Cycle the power to the transmitter and swap out the extension cable for a unit that is known to be working.
- Connect a genuine HiQ digital sensor known to be working to ensure 3TX-HiQ transmitter is functioning normally.

Last Modified March 30, 2016 | Revision 8

CLEANING, CARE & MAINTENANCE RECOMMENDATIONS FOR ZEUS™ pH SENSORS

Note: The recommendations given in this document are valid the ZEUS™ Industrial pH sensors. Best practice care and maintenance for your particular installation may vary from that described here. Contact the factory for specific information regarding proper care and maintenance of your given installation scheme and process application conditions.

<u>Storage</u>

The standard shelf life for all Iotron™ pH and ORP sensors is one year from the date of shipment. Sensors stored longer than this period may still be functional but are no longer under warranty. Sensors should be stored in a cool, dry location with the sensor tip (where the pH/ORP element is located) oriented toward the ground. All sensors come standard with a conditioning solution in the cap. This conditioning solution is 50% pH 4 buffer and 50% saturated potassium chloride (mixed by volume). The sensor cap should be keep tightly affixed to the sensor body and sealed with common piping teflon tape when the sensor is not in use. Sensors that are to be returned for shelf life warranty claim must have the original sensor cap and conditioning solution intact to be eligible for warranty replacement. Contact the ASTI factory before returning any sensor for warranty claim to obtain a valid RMA.

<u>Cleaning</u>

Cleaning methods can vary greatly depending upon the application for which the sensor is used. Some common rules for cleaning include:

1) Never scratch or aggressively scrub the pH or ORP elements. These are delicate glass electrochemical electrodes. They can be broken easily by mechanical force.
2) The reference junction is a solid state non-porous cross-linked conductive polymer embedded in a porous kynar matrix. Since the reference is solid state, it can be cleaned with aggressive chemicals. This solid state reference can also be cleaned effective by using a sharp razor edged tool. GREAT CARE SHOULD BE TAKEN NOT TO SCRATCH THE pH GLASS OR ORP ELEMENT DURING CLEANING OF THE REFERENCE JUNCTION.

Common approved cleaning solutions include:

5-15% Hydrochloric Acid – (For Alkaline deposits)
5-15% Sodium Hydroxide – (For Organic Contaminants)
Surfactant (NON-IONIC SOAPS SUCH AS MICRO-90)

Please inquire to the factory if you plan to use any other cleaning agent.

<u>Conditioning for Calibration</u>

After the sensor has been cleaned, it must be thoroughly rinsed with deionized water to remove any residual cleaning reagents. The sensor can then be soaked in pH 4 buffer to recondition the pH and reference elements. Some sensors will also require a conditioning in saturated potassium chloride if the reference junction has been depleted of the ions in the solid state conductive polymer (typical for clean water applications). Condition the sensor in saturated potassium chloride and/or pH 4 buffer for whatever period of time is required to achieve optimal calibration results.

<u>Sensor Selection for Individual Process Lines</u>

No sensor should be used beyond the indicated temperature and pressure limitations for that given sensor. Sensors should only be used for the application(s) that an authorized ASTI representative has recommended. If you are unsure that your sensor is recommended for a particular application, please contact the factory.

If you should have any doubt about whether the exact sensor model that you are using is appropriate for the installation style that you are planning to implement, please contact the factory for further assistance!

AUTOMATIC CALIBRATION INSTRUCTIONS FOR SMART DIGITAL pH SENSORS WITH INTELLIGENT 3TX-HiQ-pH TRANSMITTERS

If softwarelock (P01) is "On" then no changes can be made. Set P01 to "Off " to allow calibrations & configuration modifications. The P01 software lock will automatically reset back to "On" if no key is pressed for 60 seconds.

- Using the 'Mode' button toggle to the 'Offset' or 'Slope' LED calibration mode
- **Enter autocal mode by simultaneously holding 'Up' & 'Down' in Offset or Slope LED mode.** The display then toggles between dashes on the left & right LED until autoread algorithm is complete. If all criterion of autoread algorithm were met the autobuffer recognition feature then displays the suggested pH buffer. If all autoread criteria were not meet then an 'Err' message is returned.
- To acept the suggested pH buffer value from the auto buffer recognition feature press the 'Mode' key. Alternatively you can use the 'Up' or 'Down' keys to pick a different pH buffer followed by pressing 'Mode' key. If the user selected pH buffer exceeds the calibration limits for the given offset or slope mode then an 'Err' message will also be shown and the calibration aborted.
- If P08 three-point calibration (dual-slope) mode is enabled, the calibration will need to be performed twice in the Slope LED mode. Once for a pH buffer below 7 (only 4.00 in autocal) and once above 7 (9.18 or 10.00 in autocal). Intelligent calibration features on the 3TX-HiQ-pH transmitter automatically assign acidic slope (P17) and alkaline slope (P18) based upon buffers used in autocal.
- The pH buffer shown is nominal rather than the exact value of the pH buffer at the current temperature. Intelligent calibration of 3TX-HiQ-pH includes automatic retrieval of the exact value for the pH buffer at any temperature from 0 to 60°C as sensed by the integral platinum temperature element for the 4.00, 6.86, 7.00, 9.18 & 10.00 buffers. The pH buffer solution bottle shows the exact value of pH value of the buffer at various temperatures (see graph for visualization of temperature dependence). The exact values of these pH buffers are programmed in the 3TX-HiQ-pH for intelligent, automatic & accurate pH calibration.
- If autocal was successful 'YES' is displayed or 'Err' message is displayed if the autocal failed at any stage.
  - For offset LED mode the 6.86 and 7.00 pH buffers are the choices in the automatic calibration mode
  - For slope LED mode the 4.00, 9.18 & 10.00 pH buffer are the choices in the autocal mode
  - To calibrate to any pH buffer or grab sample value not available autocal use the manual mode
- Windows software performs auto-calibration without setting/changing initial install or last used date.

There is a 2 second averaging for ALL pH calibrate modes & 10 second averaging for the pH measure mode.

TEMPERATURE CALIBRATION INSTRUCTIONS
Temperature calibrated by pushing the 'Up' or 'Down' buttons when in the temperature display (°C) mode. *

DISPLAY FEATURES IN MAIN pH/MV LED MODE:
- The absolute mV value * of sensor is displayed with 'Down' key in pH/mV LED mode.
- The current mA output selected scaling displayed by pressing the 'Up' key in pH/mV LED display mode.

DISPLAY FEATURES REQUIRING 3TX-HiQ TO HAVE P01 SOFTWARE LOCK 'ON' TO BE ENABLED
- If 'Down' is pushed in °C LED mode offset in °C units * for current temperature offset calibration is shown.
- If 'Down' is pushed in 'Offset' LED mode, the current offset calibration in units of mV * (P16) is shown
- If 'Down' button in 'Slope' LED mode is pushed, the current slope for the live pH value is shown in units of mV per decade. The Slope1 (P17) is shown unless both P18 (dual slope mode) is enabled & the current pH value is above 7, in which case P18 is shown.

Negative values shown as flashing.

MANUAL pH CALIBRATION INSTRUCTIONS

If softwarelock (P01) is "On" then no changes can be made. Set P01 to "Off" to allow calibrations & configuration modifications. The P01 software lock will automatically reset back to "On" if no key is pressed for 60 seconds.

- Use the 'Mode' button to toggle to the 'Offset' LED and calibrate to first desired value using 'Up' and 'Down' keys. For this offset calibration the pH buffers supported in autocal mode are 6.86 or 7.00 although in manual mode it is not necessary to use any specific pH buffer or value for the offset calibration. In the manual mode the offset calibration can be performed anywhere in the full -2 to +16 pH operating range.

- Use the 'Mode' button to toggle to the 'Slope' LED and use 'Up' and 'Down' keys until the display reads the second desired value. This is most typically pH buffer 4.00 for applications that are typically acidic to neutral and pH buffer 9.18 or 10.00 for applications that are typically neutral to alkaline. In the manual mode you can select calibrate to any desired pH buffer such as 1.68 for more acidic conditions and 12.45 for more alkaline applications (be sure to set P23 to 'On' if performing calibration with this 12.45 pH buffer).

- Check exact value of pH buffer on bottle at the current temperature displayed on the 3TX-HiQ-pH transmitter and ensure that both the pH sensor and the pH buffer are at a stable equilibrium temperature.

- Set P08 to 'On' to enable the three-point calibration mode that allows for a dual slope operation. Parameter P17 slope is then used for acidic range & P18 is actived and is used measurements in the alkaline range.
  - The pH sensor is calibrated at three points to create the dual slope operating scheme:
    - One calibration typically near pH 7 in 'Offset' LED mode → P16 mV offset
    - Second calibration in pH buffer below pH7 in 'Slope' mode → P17 Slope 1 for Acidic pH
    - Third calibration in pH buffer above pH7 in 'Slope' mode → P18 Slope 2 for Alkaline pH
  - Exit 'Slope' mode after completing acidic slope calibration (below pH7) by pressing the 'Mode' before re-entering to perform the second 'Slope' calibration for the alkaline (above pH7) calibration.

- The sensor offset and slope values can be both viewed and manually entered/adjusted using the params **P16**, **P17 & P18.** All calibration settings are stored inside the IOTRON™ & ZEUS™ smart digital pH sensor in EEPROM it can be powered down or moved to a different transmitter without any loss of calibration information meaning true plug and play hot-swappable use with any intelligent 3TX-HiQ-pH transmitter.

- The optional grab sample offset type calibration is done with sensor left in service and allowed to stabilize. The grab sample is analyzed offline by the prefer method. The inline field reading is then adjusted in 'Offset' calibration mode such that the inline value agrees with the offline grab sample analyzed value.

There is a 2 second averaging for ALL pH calibrate modes & 10 second averaging for the pH measure mode.

HISTORICAL CALIBRATION VALUES FOR pH SENSORS (DISPLAY / READ ONLY PARAMETERS)

- The working mV offset * (P16), slope1 (P17) & slope2 (P18) can be viewed whether you perform automatic or manual calibrations. **If P01 lock is 'Off', the live P16-P18 values can also be manually adjusted but this feature is only recommend to be used for quite experienced users.**
- The historical calibration values can only be downloaded to file via the free ASTI HiQ Windows software
- Use P34 define calibration number shown for mV offset (P35), slope1 (P36), slope2 (P37) and temp (P38)
- The historical mV offset * calibrations shown with P35 (Valid for pH sensors & ORP sensors)
- The historical slope1 calibrations shown with P36 (Only valid for pH sensors)
- The historical slope2 calibrations shown with P37 (Only valid when P08 three-point cal mode set to 'On")
- The historical temperature offset calibrations shown with P38 (Valid for all measurement and modes)
- The date associated with each calibration can be viewed as a display feature (see ******** explanation below)

* Negative values shown as flashing.

***** Calibration reference number (P34) associated with P35-P38 calibrations is accessed by pushing **'Down'** button while value is shown. Date associated with calibration is accessed by pushing **'Up'** button while value is shown: Date format is "H"+ last two digits of year, then "m.dd" where "m" is month shown as 1-9 for Jan-Sept & A=Oct, b=Nov, C=Dec & "dd" is day of month (October 8th 2015 shown as "H15" followed by "b.08")*